

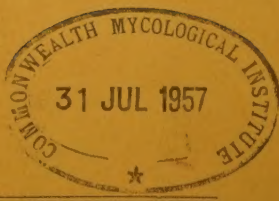


TANGANYIKA

Annual Report
of the
Department of Agriculture
1956

PART I

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PREFACE

POLICY

The policy of the Department of Agriculture is to bring about the maximum primary production consistent with sound land-use.

It is the aim to guide, foster and stimulate an ever increasing production both of foodstuffs to the extent necessary to assure the food supply of an expanding population, and of cash crops for internal use and for export in order to enable improved standards of living for the entire population to be achieved.

The efforts of the Department are directed to encouraging this increasing production while always maintaining and wherever possible building up productivity. The aim is to secure greater yields per man, per hour and per acre rather than simply to increase production *per se* by extended cultivation. Conservation of the soil and the maintenance and improvement of its fertility for the benefit of present and future generations are basic objectives; so also is conservation of water.

The Department seeks to achieve these objectives through the medium of research to ascertain and prove the practices to be advocated and through an extension service to bring appropriate advice to farmers. The research programme of the Department is based essentially on the needs of Tanganyika producers, but it is organized and carried out in consultation with the East African regional research organizations and the other East African Governments in order to secure a fully co-ordinated approach to the research problems of the Territory and to secure the best use of the resources that can be devoted to research. The extension service is being increasingly organized on the basis of the "focal point" approach to individuals as such. The Department also encourages and fosters the establishment of organizations on a co-operative basis to provide those executive services needed by producers which can best be provided collectively. The Department has a leading role to play in collaboration with the other departments in the natural Resources group which are particularly concerned with land use. The land use and farm planning section of the Department has been formed to specialize on this aspect of the Department's work.

The Department collaborates with the Game Department in the organization of crop protection services the division of responsibility leaving baboon, monkey, pig, porcupine and the lesser vermin such as rats to the Department of Agriculture.

The Department is also responsible for fisheries and policy is directed towards the development of existing coastal and inland fisheries by extension methods and the development of new fish resources with the emphasis on the stocking of dams primarily constructed for other purposes.

While the primary task of the Department could be described as adult education in the fields and farms the staff are also required to pay particular attention to the careful planning and organization of agricultural education in schools at all levels, including specialized technical training for departmental staff.

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TANGANYIKA

ANNUAL REPORT OF THE DEPARTMENT OF AGRICULTURE, 1956

Part I

I.—POLICY AND GENERAL REVIEW

From the point of view of agricultural policy 1956 can best be described as embryonic. During the early part of the year the long and short term objectives of the extension services were closely reviewed in each ecological zone or administrative district with the purpose of bringing them into clearer focus. As a result it is now possible for district teams to see a straighter road ahead and to speak with a greater degree of unanimity. This exercise in no small degree prepared the ground for formulating plans to procure the increased productivity which is vital to the steady development of the social services: preliminary arrangements for this second exercise were made in December.

Agricultural extension work in Africa frequently finds itself up against a brick wall of peasant conservatism, sometimes strengthened by political misconceptions. Unless the forces available are exceptionally strong, very little progress can be made by applying pressure on the whole length of the wall; it becomes necessary to withdraw the effort from some portions and to concentrate on small selected points, a procedure which has come to be known as "the focal-point approach". Under this method limited areas or progressive individuals are chosen for the initial attack. There are two prerequisites for success: first to gain the confidence and enthusiasm of the parties concerned; second to be sure that the practices which it is desired to introduce will in fact produce better returns. Once success has been achieved and appreciated at these points, it is then a comparatively simple matter to spread outwards from them.

Although there is a certain amount of proved information on which to found focal point approaches, there are nevertheless serious gaps in our knowledge of basic principles which remain to be filled by the research services. Here, the policy of appointing an Assistant Director (Research) and dividing responsibility at headquarters level has already been fully vindicated. Assisted by a Colonial Development and Welfare grant, plans for an expanded research organization on a quadriregional basis are beginning to take shape on the ground, and the programme for the 1956-57 season has been drawn up on fully co-ordinated lines in which prominence is given to solving the most immediate problems. 1956 also saw a still greater strengthening of the research links between the four East African territories and the High Commission research organization at Muguga.

On the conservation side an experiment was started at Mbeya designed to throw light on the relationship between the utilization of catchment areas and the water régimes: this is part of an inter-territorial investigation and involves several departments. The farm and land planning unit in the Northern Province expanded and was kept very fully occupied. The mechanical construction units also had a busy year and covered their running expenses (excluding senior staff salaries); a new unit started to operate from Iringa at the end of the year. The Pare chiefs on a visit to Lushoto were so impressed by the results of conservation work in the Usambaras that they demanded a similar scheme in their own mountains; this demand is already being met.

The main event on the educational side was the preparation of the Wami Farm School to receive its first intake in January 1957; although applications for entry were somewhat disappointing, it is perhaps no bad thing to start with a small batch of students while getting under way, and in the long run there is no doubt that this institution for training yeoman farmers will play a prominent part in the development of the Territory. Another significant new venture was the organization of a course at Korogwe for apprentice ginnery mechanics; this also is due to start early in 1957, and the response is good. The Young Farmers' Club movement became firmly established in the East Lake division of the Lake Province, and has dispelled any doubts as to its ephemeral nature; a few clubs on similar lines have been founded elsewhere.

Government or semi-government sponsored ploughing schemes are now almost a thing of the past, but the number of African owned tractors again showed a marked increase. The problem is now to find ways and means by which this trend can be guided in the right direction so that the machinery is used efficiently and economically.

There is no doubt that irrigation will play an increasing part in the productivity of this Territory where low or ill-distributed rainfall is so often the limiting factor. Irrigation, however, demands heavy capital expenditure, and careful planning is necessary to ensure that the scanty funds are deployed to the best advantage. Furthermore it takes time to train an irrigation farmer to use water effectively and economically. With such unavoidable restrictions, human and financial, no spectacular advances can be expected, but the foundations for steady progress are being laid. To this end trial farms have been established on two schemes in the Central Province and at three places in the Rufiji Basin.

The policy of integrating animal husbandry more closely with crop production made some progress, particularly in the Usambara mountains where vegetable culture based on manure from stall-fed cattle leaped ahead. In other provinces joint projects on focal point lines were started.

From a general point of view the segregation which is taking place as the African throws off his communal ties and becomes an individual is interestingly reflected in the evolution of differing systems of crop production. On the one hand the larger yeoman farmer is definitely emerging, particularly in the Northern Province. On the other hand in the Southern Province a party grouped together to work a piece of land in addition to their own holdings with the object of raising funds for their joint betterment. In the Central Province group farming with mechanical aids has not so far found a fully satisfactory method of operation. Alongside these developments a very promising and popular tenant farming system is beginning to crystallize out of the pioneer work undertaken by the

Tanganyika Agricultural Corporation, and it is almost certain that major irrigation schemes will have to be organized on these lines. The future pattern of African agriculture is passing through its birth pangs; there is a strong indication that the progeny will be many and diverse.

II.—GENERAL REVIEW OF THE CROP SEASON

The season was mainly remarkable for very heavy rainfall in January throughout the Territory. This was followed by variable precipitation in the main rains, which stopped sharply and were followed by a prolonged dry season, aggravated by the very late start of the short rains. With the exception of the Northern, Tanga and Southern Highlands Provinces, the total rainfall for the year was near average. In the Northern and Tanga Provinces the main rains were very poor, total rainfall at Arusha and Lushoto being respectively 24.31 inches and 32.99 inches compared with averages of 43.53 inches and 42.21 inches. On the other hand, total rainfall in the Southern Highlands was well above average except in Tukuyu District and Iringa township. With the exception of cotton in the Lake Province, where production again registered a new record, and oil seeds in the Southern and Western Provinces it was generally a difficult season for annual crops. While the production from plantation crops was well maintained, and in most cases increased, it was adversely affected by the long dry season, the effects of which may not be fully seen until 1957.

In the Lake Province, the short rains of 1955 started early and there was widespread early planting of maize and sorghum. This allowed a build-up of American Bollworm which later migrated to the cotton crop, causing severe damage in some areas. The long dry season badly affected the banana crop in the west Lake area. Heavy rains in January and February caused flooding of *mbuga* areas damaging sorghum and cotton crops. In the Eastern Province, severe and early flooding took place in the Kilombero and Rufiji valleys, which destroyed early planted rice and prevented later plantings. These rains also delayed the preparation of land for cotton in other parts of the Province resulting in late planting and reduced yield. The loss of the rice crop in the Rufiji had the beneficial effect of greatly increasing *mlao* cotton plantings, with a five-fold increase over the past five-year average. There were also severe floods in the Rovuma Valley and crops there and in other riverine areas were destroyed.

Yields of grain crops were reduced in the Western Province but conditions were ideal for the groundnut crop. Although the Central Province had the best year since 1952, heavy rains in December 1955 did severe damage to soil conservation works, and to communications, while crops suffered from water-logging in the early stages of growth. Insufficient later rains reduced yields in Singida.

Smaller acreages of maize and paddy were planted and maintained in the Southern Highlands Province due to the high rainfall, and the weather was not favourable to the tobacco crop. Perennial crops on the other hand did well, although dry conditions at the end of the year reduced the tea flush.

The good early rains resulted in an excellent short-rains wheat crop in the Northern Province, and were ideal for the coffee crop, which was a bumper one. But the poor long rains seriously reduced yields of grain and cotton crops and the prolonged dry season caused serious leaf fall in coffee towards the end of

the year. In the Tanga Province, yields of grain crops and cotton were much reduced by the poor main rainy season. The value of the improved methods of land use introduced by the Usambara Rehabilitation Scheme was again demonstrated. Last year, with good rains, there was the first large scale export of maize from the District for very many years; this year, with a rainfall as low as that in 1933, when Government had to supply maize meal to avert famine, it was unnecessary to import any food.

The Territory suffered no locust invasion during 1956. While there were no serious rat plagues in the Eastern and Southern Provinces this season, they occurred in both the Western and Central Provinces causing extensive damage to grain and root crops.

As a result of the difficult season for annual crops, grain yields suffered and there are rather more areas of local food shortages than in 1955. However, no widespread shortages have occurred and local shortages will largely be met by barter, by use of root crop reserves or by purchase from the proceeds of crops grown for sale. Production of foodstuffs in the Central Province, an area of frequently recurring famines, was more than sufficient in most districts, but the sale of sorghum was prohibited in order to build up further reserves.

The rainfall figures for the 1955/56 season at representative stations are given at Appendix I.

III.—MARKETING AND GRADING OF PRODUCE

FOODSTUFFS

With the removal of control over the purchases of maize and paddy, wheat is now the only food grain of which the marketing is controlled and for which a minimum control price is promulgated. With the removal of control on the sale of maize, Government offered a support price of Shs. 35/- per 200 lb. bag at port, in order to give some stability to producers while the trade was becoming organized under free market conditions. In order to protect the rice producer in the Territory from a possible fall in the price of paddy as the result of decontrol, the Customs Tariff Ordinance was amended to permit the imposition of a duty on imported rice. This duty is variable and the duty imposed in 1956 was Shs. 7/- per 100 lb.

In view of the very heavy stocks of maize and rice at the end of 1955 it seemed likely that the price of both crops would fall below the guaranteed minimum prices of 1955. But as the season developed it became obvious that the maize crop would be much lower than in the previous year, while the rice crop would be very seriously reduced by the virtual loss of the Kilombero and Rufiji crops. As a result, maize prices have been much the same as the control price in 1955, and towards the end of the year had risen from Shs. 38/- per bag to as much as Shs. 50/- per bag in the Eastern Province.

Paddy prices were generally above the control prices of 1955 and reached as high as Shs. 750/- per ton in Dar es Salaam during the season. This favourable position for the producer was due to the partial failure of the territorial crop, the disposal of the greater part of Government held stocks prior to the opening of the 1956 season, and to the imposition of the duty referred to above.

The control price of wheat for the 1956 crop was reduced by fifty cents to Shs. 52/- per 200 lb. bag Grade I, naked at mill.

Government purchased only 3,800 tons of maize at the support price of Shs. 35/-. The support price announced for 1957 has been reduced to Shs. 25/- per 200 lb. bag at port.

During the year the Tanganyika branches of the Kenya Farmers' Association, of which those in the Northern Province played a major part in the marketing of European farmers' produce, were formed into a separate company, the Tanganyika Farmers' Association. At the same time the articles of association were altered to permit all races to join. So far 50 African farmers have been admitted to membership.

COTTON

As a result of forward sales of lint to test the market prior to the opening of the cotton buying season, the Lint and Seed Marketing Board found it necessary to reduce the basic fixed price for Grade I seed cotton from 62 cents per lb. to 57 cents per lb. in the Lake Province, and from 134 cents per kilogram to 125 cents in other parts of the Territory. The price for Grade II seed cotton was maintained at 20 cents and 45 cents respectively. This small reduction in price does not seem to have affected adversely the interest in cotton growing in the Lake Province.

The number of Co-operative Societies buying seed cotton in the Lake Province increased from 113 in 1955 to 199 in 1956. The proportion of the crop bought by Co-operatives increased from 43.6 per cent to 63 per cent. While marketing proceeded without any major breakdowns, a discouraging feature of the season was the deterioration in the operations of some of the older Co-operatives. The main faults were dilatory buying, poor supervision of grading, and most particularly, a marked slowness in bagging. There was a tendency to refuse to take advice on cotton quality and on the observance of rules concerned with the marketing of the crop, which led to prosecutions. There is still room for further improvements in marketing methods, but the biggest improvement necessary among Co-operative Societies is in their sense of responsibility, and in a willingness to work and to listen to advice. Bagging and unbagging are serious bottlenecks in the smooth flow of seed cotton to ginneries, due to lack of labour, and experiments have been started in bulk handling and other mechanical aids to overcome this.

The only change in ginnery zones in 1956 was the formation of a zone for the new Kasamwa Ginnery. This was formed from neutral areas which had previously been attached to two other ginneries, together with Biharamulo as a neutral area. At the end of the year the Cotton Board recommended the formation of a new zone in Musoma District where considerable expansion of production has taken place. The erection of a new ginnery in Nzega District, to accept the slowly expanding production in the north of the District, was also recommended.

COFFEE

In November the definition of undergrade coffee exported from Bukoba was altered, removing the upper limit on the percentage of whole beans which this grade may contain. The older definition did not provide adequately for all undergrade coffees, some of which, while not falling into the FAQ grade, could not be brought up to that standard, and yet could not legally be exported as undergrade.

Considerable quantities of native grown coffee in Bukoba continued to be purchased illegally outside the co-operatives, or were smuggled into Uganda to take advantage of higher immediate prices due to the operation of a price assistance fund there, and to avoid local cesses. Smuggling was effectively reduced after the first payment to growers was raised considerably in July.

Discussions between Government and the Tanganyika Coffee Growers Association, regarding legislation to provide for one channel marketing of non-native mild coffees through the Association, failed to reach a conclusion satisfactory to both sides.

OTHER CROPS

There were no changes in marketing arrangements for other crops, but there has been a growing interest among African producers in the Western Province to combine into groups to sell their produce in bulk. One such association marketed 200 tons of maize and 39 tons of pigeon pea direct to the trade at a useful profit. Another group marketed groundnuts direct to a buyer in Dar es Salaam. Elsewhere co-operative societies continue to develop, but suffer too often from lack of loyalty of the members.

In most districts where there are organized Native Authority markets, a cess, which makes a considerable contribution to local revenue, is imposed on produce passing through them. There is a growing tendency for producers to sell their produce outside markets, to avoid the payment of this cess. Not only does this adversely affect revenue, but it also makes it increasingly difficult for this Department to obtain any reliable estimates of surplus crop production.

PRODUCE GRADING

Where produce is marketed through producer organizations or statutory Boards it is generally graded and quality can be more readily maintained. But maintenance of quality depends largely on sustained effort by the primary producer and primary co-operative societies who are too often insufficiently interested in doing so. This has been particularly so in the case of robusta coffee in Bukoba, where the noticeable improvement in quality of the 1955 crop has not been maintained in the current season, and the premium over Uganda 10's was lost after three months' marketing. Rejects on grading rose from 3.62 per cent in July to 56 per cent in December.

The problem remains of improving quality in those crops which pass through the scattered local authority markets in the Districts. To impose grading at all markets would call for a large staff of graders and considerable recurrent expenditure. Part of the answer no doubt lies in the hands of the primary purchaser who remains indiscriminating as to the quality of produce which he is willing to accept. Premia for pure strains and high quality may be one incentive to the producer, although where this has been adopted, there has been little increase in the production of premium varieties. It is unlikely, however, that there will be any appreciable improvement in the quality of produce passing through markets until up-country buyers, and their principals, show much greater discrimination in their purchases.

IV.—MAIN CROPS

Figures for production of individual crops are collected together in Appendix II. These figures should be read with some reservations. Whereas statistics for crops such as sisal, cotton, tea, coffee, pyrethrum, seed beans and tobacco have a high degree of accuracy due to the way in which these crops are marketed, those for annual crops produced by the African peasant are only generally estimates. Much of this production is either consumed or processed locally, and the figures which reflect seasonal production best are those for exports, which are shown in Appendix III. However, estimates of production for sale on a Provincial basis have been given as these are derived from similar sources year by year, and can show general trends over the seasons, as well as indicating the most important producing centres.

SISAL

It has been a disappointing year for the sisal industry. Prices, which at the beginning of the year were at their highest for twelve months, did not hold in the face of poor harvest prospects in Europe and of unsettled conditions at the end of the summer. By the middle of the year the price had declined from £90 per ton for Grade 1 to £75, and later fell to below £70. Some recovery took place at the end of the year, but finished no higher than £76 per ton.

However, production recovered from the slight set-back in 1955 and reached a new record at 185,762 tons. Although rainfall was poor in the Tanga Province, current production was not adversely affected. Despite the disappointing market, there was some expansion of planting on old estates while the development of new estates in the Eastern Province continued.

Due to the profitability of other crops, the African production of sisal from plants grown as hedgerows in the Lake Province showed a further fall. The estimated quantity sold was 1,000 tons compared with over 1,200 tons in 1955 and 5,100 tons in 1954.

Reference was made in the last report to the important problem which faces the industry in the restoration and maintenance of soil fertility. The work which has been done at the Sisal Research Station over the past 21 years has shown at the experimental level some of the methods by which this can be done. In order that the application of these methods can be studied and proved in practice it is necessary to move to the estate scale of operation. During the year a Committee, under the Chairmanship of Dr. E. W. Russell, was appointed by the Sisal Growers' Association to advise on future research work on sisal in the light of the results achieved in the past 21 years.

COFFEE

(a) *Mild coffee*.—The past season was a very good one for the mild coffee industry, except in the Mbozi area. Excellent early rains ensured a good crop set, and with young plantings coming into bearing, production in many areas reached new records. Unfortunately, the severe dry season and virtual failure of the short rains in the Northern Province is likely to have a very adverse effect on the new crop.

With prices maintaining their past good level, interest among Africans in developing new areas, including some marginal areas, was sustained. Unsuccessful attempts were made in the past to establish an industry in some of those places, and only by the very closest attention to the details of good husbandry, and by limited plantings in the first case, is it likely that success can be achieved. Unfortunately this fact is not always fully appreciated.

The crop in the Northern Province, the chief producing area of mild coffee, was a record one. Irrigation including overhead systems, is being increasingly used there. It is particularly gratifying to note a rising interest among African growers in Arusha District in improved husbandry and pest control methods. A satisfactory start was made with the introduction of the use of dieldrin to control white coffee borer (*Anthonus leuconotus*) in African coffee on Meru, and in Moshi District, where over a quarter of a million trees were treated in focal point areas. This treatment has become standard practice in a large number of non-native estates.

During the year the Department of Agriculture took over from the Moshi Native Coffee Board the supervision of pest control in African coffee in Moshi District, and the provision of seedlings, together with the Board's staff employed in this work.

The Mbozi area suffered from unfavourable weather during the critical flowering and setting period resulting in another poor year. However, early prospects for next season appear better than for several years. But as has been pointed out in previous reports, climate and soils are not the only causes of low productivity in this area, and until the high proportion of old and uneconomic trees are replaced by well established young coffee, productivity is unlikely to show much improvement. Interest in irrigation was sustained and some planters placed orders for overhead irrigation equipment, while two others prepared gravity systems. Unfortunately, shortage of water limits the area which can be irrigated. The investigations at the Coffee Sub-station into methods of overcoming "dieback", "black tip" and zinc deficiency, continued to give encouraging results and indicated that the treatments were along the right lines.

African coffee production in the Southern Highlands showed a substantial increase this season, and there is a valuable further production potential in that area. There was active interest in planting, stimulated by leading growers who took part in a most successful tour of the Meru area in Kenya. The Rungwe crop was a record at 1,200 tons of parchment: the young industry in Lupembe, where there is a thriving Coffee Growers' Co-operative, made steady progress and produced 25 tons; the comparatively young industry in Mbozi made fair progress, but unfavourable conditions led to a slightly reduced crop of 142 tons. Average yields in all districts were low but the good yields from isolated fields show that there is room for considerable increase in productivity with better husbandry. More attention to the better establishment and after care of the crop is required, but there was progress both in pruning and in pest control.

Production in Songea District continued its steady rise and almost reached 600 tons in 1956. More young trees came into bearing and further acreages were planted. While there was a marked increase in spraying against *Antestia* there is considerable scope for improvement in field practices, including mulching and shade.

The revival of interest in coffee growing in the Usambara and Pare Mountains continued, with further increases in planting. There was an enthusiastic demand for the spraying service operated by the Usambara Co-operative Society against *Antestia*. There was also a big increase in production in the Uluguru Mountains from 194 tons to 331 tons; both arabica and robusta are grown. Growers were encouraged by the high price for arabica to market the two types separately.

Attempts to establish coffee in the Buha Highlands had varying success, but it is obvious that conditions are marginal and call for very close attention to detail in planting the crop, and the very careful choice of sites. This can only be achieved by a slow expansion and personal contact between field staff and the growers. On the other hand, new plantings in North Mara, Lake Province are flourishing, and the growers were prepared to follow advice and to start with a restricted number of trees.

(b) *Hard Coffees*.—The robusta crop was a very good one but this is not reflected in the marketing statistics as considerable quantities were smuggled into Uganda in the earlier part of the season. Unfortunately, the high quality reached in 1955 was not maintained in 1956 due to lack of sustained interest on the part of the primary buying societies. The societies and the Co-operative Union are disinclined to institute any inspection of dried cherry, in which form 90 per cent of the crop is marketed, and without this any useful improvement in quality will not be achieved. On the other hand the arabica crop retained its high quality. While there was a gradual improvement in coffee husbandry in the West Lake area, there is room for much greater effort.

Prices for robusta during the year were rather better than at the end of the previous season, between £240 and £246 per ton being paid at Mombasa. Arabica prices were on a par with the best prices of the previous season, and averaged between £400 and £443 per ton at Mombasa.

Elsewhere there is a small African production of robusta coffee in parts of the Tanga Province, where an estate is also developing up to 500 acres, and interest in planting this crop in the lakeshore area of Rungwe was well maintained.

(c) *Coffee Pests*.—*Stephanoderes* was particularly destructive in Bukoba, causing the rejection of much coffee as F.A.Q. Spraying trials with Endrin were successful on an experimental scale. Elsewhere white coffee borer and *Antestia* remained the most destructive pests but both can be adequately controlled and, as has been indicated above, the use of control measures is spreading satisfactorily.

A new disease of coffee was reported in the Northern Province and is under investigation by the Plant Pathologist. Diseased trees show a typical bottle-like swelling on the lower stem, accompanied by furrowing and pitting of the wood, and die back.

(d) *Research*.—In addition to the main lines of work on the improvement of planting material and growing conditions for coffee at the Coffee Research Station, Lyamungu, particular attention was given to different systems of training the coffee bush. A laboratory investigation of the artificial drying of coffee was started and the coffee nutrition investigations, based on a series of leaf and cherry analyses, neared completion at the end of the year. A full account of the season's work will be found in the annual report of the Station, which is published separately.

A Committee, under the chairmanship of the Director of the East African Agricultural and Forestry Research Organization, made recommendations on the future research programme of the Station.

COTTON

The main features of the season were a further increase in production in the Lake Province to a new record, which, but for heavy insect damage in some areas, would have been considerably greater; the opening and operation of the first ginnery owned by an African Co-operative in the Territory; a very large increase in cotton production in the Rufiji District of the Eastern Province, following the failure of the rice crop due to floods; and a disappointing check to the expansion of production in the Tanga Province due to drought.

Final figures for the Lake Province crop are not available, but it will not be below 120,000 bales, exceeding the previous record by some 12,000 bales. Early in the season there was every prospect of reaching 150,000 bales, but heavy infestation by American and Spiny Bollworm, together with other pests and late Blackarm, caused an appreciable reduction. It is estimated that there were 218,850 growers, with an average of 1.54 acres each. £3,810,600 were paid to growers for their crop. The increase in production was due largely to an increase in the number of growers, and not to any considerable increase in individual acreage. The yield per acre fell to an average of 420.8 lb. seed cotton. The quality of the crop in the field was not quite as high as in 1955, and the percentage of BR marketed would have been higher than 6.8 per cent had not much of this grade remained unpicked.

The Lake Province crop consisted of UK 51 and all seed was dusted against Blackarm. 6,740 tons of seed of the same strain have been dusted for distribution to growers for 1957 crop. The provision of three more dusting machines and a chain of seed stores by the Lint and Seed Marketing Board led to a more efficient and rapid distribution than in the past. The assistance of the Co-operative in the distribution of seed has given a welcome relief to Departmental staff who have been able to concentrate on other duties. The new strain UK 55 was further bulked up on Kome Island and will go through one more bulking stage before distribution can begin. Interest in cotton growing shows no signs of decreasing and there have been heavy demands for seed for the coming season.

Efforts to increase cotton production in the Eastern Province were largely defeated by the very heavy rainfall during the period immediately prior to planting, and had it not been for the considerable increase in the *mlao* crop in Rufiji, following the virtual total loss of the rice crop, production in this Province would have been the lowest for some years. Kilosa District suffered particularly and the crop was halved. Insect damage was however much reduced, and the quality of the crop was very good. It is estimated that 8,460 bales were produced and the crop was worth £227,000 to the growers. Three more ginnery zones received the new strain 47/10 and in 1957 the whole of the Eastern Province crop will be derived from this strain.

Estate production of cotton remains negligible. Those few who do plant often fail to follow good cultivation practices and almost invariably the crop is planted too late for optimum productivity.



Photograph by D. W. Phillips

A tractor of the Lake Province contract ploughing and cultivation service putting up a large Sukuma ridge.



Photograph by Sisal Research Station

Sisal is the Territory's most valuable export crop. Extensive agricultural research on the crop is carried out at the Tanganyika Sisal Growers' Association Research Station in the Tanga Province. The dwarfing effect of heavy cutting on the sisal plant is shown in this photograph of part of a cutting trial.



Photograph by R. Smith

The value of insecticides in controlling American Bollworm in cotton in the Eastern Province has been extensively demonstrated in African holdings. The cotton on the right of this photograph was dusted, that on the left received no treatment.

The need for insect control in cotton in the Eastern Province has been stressed in previous reports, but progress in persuading the growers to adopt the proved preventive practices has been slow. Highly successful demonstrations of dusting cotton were made in widely scattered centres, using well grown cotton in the fields of African growers. Yields were roughly doubled in most cases, on basic yields of some 550 lb. per acre. Cotton growers were taken to see the demonstrations but their reactions were not particularly favourable on account of political influences which suggested that either dust should be issued free, or the growers should receive a premium for cotton which has been dusted. However, despite this counter propaganda, eighty growers in the Kilosa District have already deposited money for insecticides for 1957. For the profitable use of insecticides the standard of cultivation must be high, and insecticide will only be issued to these growers after inspection of their fields.

The attack of American bollworm in the Lake Province indicates that insecticides may have to be used in certain districts to attain maximum productivity, and in the more marginal areas stainers also need to be controlled. The bollworm problem, however, is not new, and attacks are almost certainly linked with climatic conditions and the planting of other susceptible crops. It needs to be studied in this light before embarking on the widespread use of insecticides which can only be regarded as a temporary palliative likely to bring other disorders in its train.

Following the excellent year for cotton in 1955, there was a considerable increase in the acreage planted in 1956 in the Tanga Province. Unfortunately the extremely dry season, together with late planting in Handeni, led to very low yields, but total production was expected to be much the same as in the previous year. The reviving industry in the Northern Province also suffered severely from drought, but the increased acreage was expected to offset lower yields and production will be much the same as in the previous year.

The production of cotton in the Southern Province fell to negligible proportions due to the damage done by Red Bollworm, and to the increasing interest in cashew nuts. It is very unlikely that there will be any revival in production until work which is being done elsewhere on the Red Bollworm problem results in an economic method for controlling the pest.

Interest in growing cotton continued in the Western Province despite low yields due to poor husbandry, uncertain weather and insect attack. In Nzega the problem of insect damage is not as great as in Kahama, quality was good and production, at 118 tons of seed cotton, was 40 per cent better than in 1955; with better husbandry there appear to be some possibilities of establishing a small industry. Although trial plots in Kahama in 1955 had shown the expected heavy insect damage to the crop, over 1,000 peasants planted cotton in 1956. Yields were low, but this area lacks useful cash crops and cultivators seem content to accept poor returns which do bring in some cash. There were increased demands for seed at the end of the year.

Substantial claims were received from important overseas buyers on account of serious adulteration of lint produced in the Lake Province in 1955. Intensive efforts were therefore made to bring about an improvement in marketing methods and in all aspects of ginnery operation. It is encouraging to report the ready co-operation of most ginneries with the Department in this campaign, and there

was a very satisfactory improvement in the quality of ginning, with a reduction in foreign matter, broken seed and stripper damaged lint. There is, however, still room for further improvement in the supervision of work within the ginneries.

Labour was again difficult to obtain but considerable strides have been made in the provision of labour-saving machinery in ginneries. Modernisation of the ginning industry continues: one old ginnery is being replaced by a new one, another has been partially rebuilt, while others have increased their ginning capacity.

The new ginnery at Kasamwa, erected by the Victoria Federation of Co-operative Societies, was opened by His Excellency the Governor on 23rd June. This ginnery has operated well.

Complaints about the quality of lint were not confined to Lake Province production and there is need for very considerable improvement in the ginneries and in the supervision of ginning in the Eastern Province, where the standardization of ginneries progressed only slowly. The low production in this Province for some years past has made it difficult for ginners to introduce all the improvements which are desirable, but a promising start has been made with new type gins and automatic feeders, while the conversion from double acting to single acting gins is practically complete, with noticeable improvement in the quality of ginning. But that two ginneries still do not have seed cotton openers is an indication of the state of the ginning industry in this part of the Territory.

A Ginnery-Mechanics Apprenticeship Scheme has been organized by the Ginneries Officer, Morogoro, with the co-operation of the ginners and the departments of Labour and Education. The course will take place at the Korogwe ginnery and will last a full year. In addition a cotton gin, presented by the Tanganyika Cotton Company, is being installed at the Ifunda Training Centre.

(b) *Research*.—Research is concentrated at Ukiriguru, for the Lake Province, and at Ilonga, for the Eastern Province. At Ukiriguru, probably the most important work is concerned with the breeding and selection of strains resistant to Bacterial Blight (*Xanthomonas malvacearum*) combined with the use of seed dressings against this disease. In addition, agronomic trials and the breeding of strains with improved yield and quality continued.

At Ilonga, the work is chiefly directed towards the breeding and selection of improved strains to replace the first improved cotton now in general cultivation. Special emphasis is now being placed on types for growing under irrigation. In addition, agronomic trials were continued.

A full account of the work of these Stations is given in Part II of this report.

CASHEW NUTS

The production of cashew nuts continues to expand as new plantings come into bearing, and this crop now takes fourth place in value in the Territory's agricultural exports. Over 90 per cent of these exports come from the Southern Province, but expansion is particularly noticeable in the Eastern Province, fostered by the continued good prices for this commodity. The marketing of the crop was not complete at the end of the year but production is estimated to have been over 20,000 tons, of which 16,300 tons had been exported from the Southern Province at the end of 1956.

The crop in the Southern Province was reduced by a poor nut set after good flowering and by extensive *Helopeltis* damage in some areas. In the Eastern Province the crop was affected by the long drought, and by heavy *Helopeltis* damage in Bagamoyo District.

Considerable attention has been given to improving the husbandry of the crop in the Southern Province where trees are generally spaced too closely, and inadequate cleaning of immature plantations leads to losses through fire. But the most important need is to control the considerable losses in crop from *Helopeltis*. Dusting trials with 0.5 per cent Gammexane have been continued in Newala District and at the Coast Agricultural Station, Chambezi. Results in Newala have been very promising.

The development of a very large acreage of cashew nuts by an American firm on land within the Tanganyika Agricultural Corporation's area at Nachingwea has been under investigation. The chief interest in such a development would be the production of shell oil, a very valuable by-product of the present kernel production. In the Eastern Province the planting of this crop has been largely confined to the coastal Districts but interest is now being shown in its production in more inland areas, where isolated trees fruit well. Extensive plantings have also taken place in the coastal area of Tanga Province as well as inland in Handeni District. Unfortunately the system of land tenure in Tanga, which prevents alien Africans from planting perennial crops, forms a definite bar to increased production. A plantation of 200 acres has been established as far inland as Singida District in the Central Province.

CASSAVA

Although of major interest as a food reserve against famine, cassava is an important cash crop in parts of the Southern, Western and Eastern Provinces. In both the Southern and Western Provinces it was a good season for cassava and with a strong demand and high prices for dried root prevailing in Europe, sales in those Provinces were very greatly increased. With yields as low as 2 tons of dried root per acre, a very useful cash return of nearly Shs. 400/- per acre can be obtained. Rules for the compulsory planting of specified acreages of cassava as an anti-famine measure are now being applied rather more selectively, more reliance being placed on the greater production of crops for sale where cassava does not crop well.

This crop suffers particularly from pig damage and the planting of the bitter variety *Liongo* is being extended as this variety is largely immune to attack. While most of the cassava exported comes from sweet varieties, the suitability of bitter types for the production of starch is being investigated in co-operation with the Colonial Products Advisory Bureau.

Interest in the local production of starch by the wet process has been revived both in the Western and Eastern Provinces where there is certainly scope for small scale factories, similar to those in Malaya. However, so far there have been no real developments in this direction.

Major cause of low yields remains the high incidence of mosaic, and trials of resistant varieties bred by officers of the East African Agricultural and Forestry Research Organization continue. Progress with the introduction of these strains to general cultivation remains slow, although considerable quantities

were distributed in the Tanga Province. The strain 46106/27 gave yields double those of ordinary varieties in that area. Multiplication plots of mosaic resistant strains have been established throughout Sukumaland and East Lake, and in some other areas.

Local outbreaks of White Scale continue but cultivators are reluctant to apply effective control measures. The Elegant Grasshopper (*Zonoceros elegans*) remains a destructive pest in many districts through its annual infestation of cassava towards the end of the year, when it does much damage through feeding on the stems.

COCONUTS

There was a marked fall in copra production during the past season. This was due in part to the very dry conditions in the Tanga Province and to the ever growing demand for fresh nuts in Dar es Salaam and Tanga. While prices were again variable, they were at a somewhat higher level than in 1956.

Although the price differential between sun-dried and kiln-dried copra is not very great, and gives little incentive to African producers to lay out the capital to build kilns, more small kilns were built in the Tanga Province, often with assistance from the African Productivity Loan Fund. Two of these kilns were of a new design which cuts down the curing time from four to one and a half days. Users of these kilns received a premium of 50 cents per frasila. Elsewhere production was of variable quality, largely due to the harvesting of immature nuts, but the appointment of a market inspector in Mafia had a good effect on quality.

New plantings under the Planting Bonus Scheme fell off considerably, and were confined almost exclusively to Tanga and Pangani. The results of this scheme have not been entirely satisfactory, and in some cases new plantings have been made on unsuitable land, and the future of this scheme is at present under review by Government. The total area which has been planted under the scheme since 1952 in all areas is 2,490 acres.

High quality copra was produced by the estates on Mafia and in Bagamoyo District. The use of the Marden roller on certain estates virtually replaced all hand labour for the control of bush and grass. It also led to the burying of dead coconut trees which obstructed the machinery, a plant sanitation measure which is largely ignored in the Eastern Province, despite persistent efforts by the Department to obtain observance of this elementary practice of good husbandry.

Further aerial spraying trials were made on Mafia against the sucking bug *Pseudotheraptus wayi* Brown, which causes considerable losses to the coconut crop in the coastal belt. These trials were made with the assistance of the Colonial Pesticide Research Unit, and were much more successful than the first series of trials made in 1955. It is hoped that this work will be continued by the Research Unit, in conjunction with investigations in Zanzibar.

Tapering disease caused many deaths among coconuts in parts of the Eastern Province and it is of interest to note that the palms are being replaced by cashew nuts. The causes of this disorder are being investigated at the Coast Agricultural Station.

MAIZE, SORGHUM AND MILLETS

(a) *Maize*.—With the removal of control there was some anxiety among producers regarding the price which would be paid for the crop on a free market. This led to rather smaller acreages being planted in marginal areas, but the biggest factor in reducing the quantity for sale to about half that of 1955 was the poor distribution of the rains. Crops were particularly reduced in the Tanga Province and in Moshi District due to drought, while the heavy early rains in other areas led to losses from water-logging or from an inability to plant.

Maize remains the most popular African staple foodstuff and peasants continue to produce it in many areas where other crops would be more suitable. Some success was obtained in persuading growers in marginal areas in Handeni to replace maize with sorghum. Maize is also an uneconomic crop in the higher mountain areas of the Southern Highlands Province, and lower prices may turn attention to other more suitable crops.

The maize breeding project undertaken by the Tanganyika Agricultural Corporation at Nachingwea reached a significant stage when a segregating mixture of strains resistant and non-resistant to *Polysora* rust was used on a field scale on the farms this season. Results were highly satisfactory. The production of a synthetic strain of Katumbili maize at Ilonga made good progress. Very short term maize showed interesting possibilities in the marginal areas of the Northern Province and further work is to be done on this type.

(b) *Sorghum*.—This crop is the main staple and raw material for beer making over a large part of the Territory. Sorghum is one of the first crops sown in the season and production is liable to suffer adversely in years of heavy early rains, which delay weeding, and cause water-logging. With the exception of the Central Province, crops were below average in 1956. It is extremely difficult to give any reliable figures for the production of this crop, as much is not sold on the markets, and little finds its way to export. Towards the end of the year the price rose in the Eastern Province to Shs. 50/- per 200 lb. bag, and an unusual feature was that the price generally kept Shs. 5/- above that for maize.

Although sorghum is a safer crop than maize in many parts of the Territory, most of the varieties grown have a long growing season, which renders them somewhat vulnerable in years when rainfall is particularly ill-distributed. The breeding of shorter term varieties, with other improved characters has been under way for some time at Ukiriguru and the first strain, SUK 1, although not fully satisfactory, has proved very successful in the Central Province, and shows signs of being accepted by the growers. This strain has not been as popular as had been hoped in the Lake Province but it proved useful in replanting main crops which had been destroyed by flooding. Better strains are now in view. Cultivators in the Eastern Province have also shown considerable interest in short term sorghums after seeing them at the Research centre at Ilonga.

(c) *Pests and diseases of Maize and Sorghum*.—Stalkborers are a universal and destructive pest throughout the Territory. However, incidence in some areas was rather less during 1956, notably in the Central and Western Provinces. Following trials and demonstrations of the use of DDT dust to control this pest, peasants showed a growing interest in its use in the field, particularly in the Northern and Western Provinces. Trials were continued elsewhere.

American bollworm is also a widespread pest, and did considerable damage to short term sorghums in Morogoro. Although later planted maize can form something of a trap crop in cotton areas, early sown maize and short term sorghums provide a breeding ground for this pest, and a source of heavy infestation of cotton later.

Central-shoot fly is a widespread pest of sorghum in the drier areas, and severe damage occurred in parts of the Lake Province. This pest is particularly damaging to short term sorghums which have been late planted.

There were local outbreaks of Army worm, but damage was not serious.

(d) *Millet: Bullrush millet*.—This crop is of importance in the Lake, Western and Central Provinces. Seasonal conditions reduced yields somewhat in the first two provinces, but production was above average in the Central Province. A short term variety which was introduced with famine food in 1953 proved very popular there, but unfortunately is now losing its character through out-crossing with local varieties.

Finger Millet.—This crop is grown very largely for beer making and forms an important cash crop in Sumbawanga and in parts of the Lake Province, as it is largely exported to the Northern Province and to Uganda for brewing. An increasing amount was produced in Kondoa and found its way to the Northern Province. The traditional methods of cultivation in the Southern Highlands Province give rise to a serious erosion problem and efforts to show that successful crops can be grown without the annual destruction of large areas of woodland were continued.

OIL SEEDS

The past season was an extremely good one for both groundnuts and sesame, and production showed a very welcome recovery. These form important cash crops in areas where cotton does not succeed, but even in the Lake Province, where interest in cotton planting had relegated groundnuts to little more than a subsistence crop, there was a useful increase in sales due to the favourable season. Every encouragement is being given to the broadening of the peasant economy there by the inclusion of a second cash crop and groundnuts, which have retained their price over a considerable period, are particularly valuable for this purpose.

(a) *Castor*.—This crop is of particular importance in the dry Central Province which produces some 50 per cent of the Territorial crop. Prices were very good and there was an increase in production in most areas. As much of this crop does not pass through established markets it is not possible to give accurate figures for production, but 12,000 tons were exported, a small part of which originated in the Belgian Congo.

Work on the selection of good strains of indigenous varieties continued.

(b) *Groundnuts*.—While the production of groundnuts suffers periodic setback due to unfavourable seasons, there has been an increasing interest in this crop, and with excellent conditions this year, there were large increases in production in Western, Central, Lake and Southern Provinces. Prices remained at much the same level as in 1955. Production is estimated to have been doubled and there is scope for further expansion. Farmers in the Ol Joro area of the Northern Province showed interest in the possibilities of this crop following encouraging results from trials in the area.

The only reports of serious damage to the crop from Rosette disease came from Singida District. Now that the resistant variety Mwitunde, developed by the Tanganyika Agricultural Corporation, is being grown on a large scale by the Corporation, seed supplies are available to replace susceptible varieties. This replacement was successfully started in the Masasi District in the Southern Province.

(c) *Sesame*.—The main production area is the Southern Province where conditions were ideal for the crop, which reached an all time record. Exports from the Province were almost twice the quantity previously exported from the whole Territory in any calendar year. Production was helped by the increasing use of insecticidal dust against flea beetle which causes serious losses in seedlings. The crop in the Eastern Province, the only other province having an appreciable production, was well above average.

(d) *Sunflower*.—Although there was an increase in this crop in Morogoro District, and in one or two minor areas of production, territorial production continued to decline, particularly in the largest centre of production in the Western Province. Prices were low in 1956, and while the ease of its cultivation still makes sunflower a considerable competitor to cotton in the Eastern Province, poor cash returns may well encourage a return to the more exacting crop. The very mixed nature of the seed usually planted is an appreciable factor in low prices; attempts to foster a better and more standardized product have been started.

(e) *Trichilia emetica*.—The *mafura* nut is indigenous to part of the Southern Highlands Province and is collected by women and children for sale to a local soap works. A rather larger quantity, 239 tons, was sold this year but efforts to encourage expansion of the industry have not been successful so far.

(f) *Allanblackia nuts*.—These nuts are collected from trees of *Allanblackia uluguruensis* and *A. stuhlmanni* which occur in the rain forests of the high Uluguru and Nguru Mountains in Morogoro District. In common with most wild products, the quantity collected tends to depend on the return from cultivated crops during the season, and following good crops of food and cotton around the mountain massifs, there was a very substantial drop in the quantity sold, from 53 tons in 1955 to 12 tons in 1956. The oil is used as a butter substitute.

PULSES

Not only are several of the pulse crops an important part of the staple diet, but they are also very useful subsidiary cash crops. In highland areas mixed beans are a major cash crop while in other areas cowpeas, green gram, and chickpea are of importance.

Unfortunately accurate figures of production of most of the pulse crops cannot be given as much is not sold in the markets. The figures quoted are only for the crop known to have passed through markets.

Rain-grown crops of mixed beans in the highlands suffered from the heavy early rains, but a large part of the production comes from floodlands after the water has receded, and crops there were excellent. Total sales were only a little below those for 1955.

With a favourable season the production of yellow peas in the Southern Highlands was much improved, despite the poor prices in the previous seasons, and it is estimated that the crop was double that in 1955. It is doubtful whether there was any increase in acreage but there were no severe frosts in the highland areas which so reduced crops last year. The bulking of two varieties of yellow pea obtained from the United States of America continued successfully.

Chickpea is an important crop in the Lake Province where it is planted in the low-lying heavy black soil *mbuga*. Production, estimated at 1,200 tons, was very much below average due to widespread flooding and to dissatisfaction with the prices ruling in the past two years. The low production raised the price considerably and increased plantings are anticipated in the coming season.

Of the pulses of minor importance, bambara nuts gave a good crop in the west of the Lake Province; pigeon peas continued to grow in popularity in Kigoma District and 456 tons were sold in the Western Province. Cowpeas have increased in importance in Njombe District where over 300 tons were sold. There may be scope for greater production to provide part of the protein in pig rations.

At present the only appreciable production of soya beans comes from the farms of the Tanganyika Agricultural Corporation at Nachingwea, where this crop is now well established. It was also planted most successfully on a sisal estate in Kilosa District and it is felt that there is considerable scope for the expansion of this crop in many parts of the Territory. Work continued at research centres to prove suitable varieties.

PYRETHRUM

Although rainfall distribution was not favourable to the crop in the Northern Province, production of pyrethrum both there and in the Southern Highlands Province showed a further steady advance, reaching a new record of 800 tons. Both yields and pyrethrin content were lower than in previous years. There was increased planting in Iringa District, where some farmers used irrigation with marked improvement in dry season yields. In Uwemba superphosphates are now used as standard practice as a result of the series of experiments run in co-operation with the Farmers' Association there. Interest was also maintained in the possibilities of mechanical equipment for cultivation and harvesting. An account of the current year's experiments is given in Part II of this report.

In both Njombe District and the Northern Province African interest in the crop was sustained. The policy for development was agreed with the Pyrethrum Board and provides for careful guidance and control of production, which will be concentrated in Njombe in four areas. The issue of individual licences will depend on a high standard of cultivation and soil conservation. It is hoped that the application of these measures will eventually have a beneficial effect on the standard of farming generally. One co-operative society built a Culwick drier to serve the existing acreage of African-grown pyrethrum.

There were no changes in arrangements for the marketing of the crop which continued through a joint pool with Kenya producers, payment being made on a basis of pyrethrin content.

RICE

The production of rice was seriously affected by the heavy early rains and the total quantity marketed was only half that of the excellent crop in 1955. In the Rufiji Valley, which in a good year produces half the territorial crop, heavy early floods destroyed a major part of the planted rice and prevented replanting, and sales were reduced from 9,600 tons in 1955 to 546 tons. Elsewhere the heavy rains brought about strong weed growth and caused a significant reduction in the acreage planted. In the Tanga Province, where much of the rice is grown under primitive irrigation, the crop was good, and with the opening of several new furrows, the acreage planted at the end of the year was significantly increased. Unfavourable weather in the Western Province reduced yields.

The mechanical cultivation of rice was undertaken by a few estates, in addition to the Government farm in the Kilombero Valley. The failure of the later rains ruined one crop in the Western Province while an attack of Brown Spot (*Cochliobolus heterostrophus*) considerably reduced yields in the Ruwu Valley.

In last year's report attention was drawn to the potential for increased production of this commodity as various irrigation schemes come into operation. The need for greater attention to the production of quality rices, and for co-operation of the milling industry was also stressed. In these respects it is of interest to note the slowly growing use of small privately owned dams for the irrigation of paddy in the Western Province, while high yields were obtained where larger storage dams were used. One of the major difficulties in the way of improved quality in the product is the marketing of mixed types of paddy by the growers. Progress in replacing these, and in educating producers to keep better strains separate, is bound to be slow, but it is encouraging that the Rungwe paddy societies have stated that they will accept only Faya paddy next season. In the Lake Province the best strains of Kahogo and Afaa isolated by the Botanist are being bulked at Mwabagole and at Maiya. On the milling side, some replacement of old inefficient hulling machinery took place, but greater discrimination in purchases and greater attention to the production of a high grade rice are required.

SEEDS

There was little change in the seed bean industry. At the beginning of the season demand for seed beans was light and prices were somewhat lower than in the immediate past. The season was fair as far as yields were concerned but exports showed a considerable drop on the last year.

No major outbreaks of disease occurred and the condition referred to last year as "oily pod" did not appear to any noticeable extent.

An interesting development is the increasing acreage which is being devoted to seed peas in the Ol Molog area of Moshi District. Very high yields were recorded and this partly compensated for the drop in the level of seed bean exports.

The first attempt by a farmer in the Mbozi area of the Southern Highlands Province to grow seed beans produced a very promising stand, but the crop was ruined by anthracnose.

SUGAR

The only estate producing white sugar is that of the Tanganyika Planting Company in Moshi District. The Company continued to develop its land, all of which is under irrigation, and production expanded by some 80 per cent. A new factory on the estate was completed during the year and was formally opened by his Excellency the Governor in July. Production by the Company over the past five years has been as follows:

1952		1953		1954		1955		1956
9,666	...	10,708	...	10,732	...	10,415	...	18,025

Negotiations for an extensive area in the Eastern Province for development for the production of white sugar continued. Interest in sugar production in Bukoba was sustained and one concern expanded its area under cane to 2,000 acres. There was also overseas interest in the development of an estate in that District.

There is a considerable consumption of sugar as jaggery on sisal estates and production is mainly centred in the Eastern Province. It is estimated that 800 tons were produced, but due to the poor types of cane used, yields were low.

All stocks of sugar cane varieties at Chambezi and Morogoro were infected with "Ratoon Stunting" disease and were destroyed. It is intended to replace them with new strains from Uganda which have passed through quarantine, and have been bulked up there. On the Tanganyika Planting Company's estate all planting material was heat treated to prevent the spread of this disease.

TEA

This well organized industry continued to expand. Two new factories came into production towards the end of the year, and considerable interest was shown by overseas tea interests in tea planting prospects in the Territory. Large acreages were made available for new planting in the Usambara Mountains, and trial plantings were made in both the Uwemba and Lupembe areas of the Southern Highlands. While the suitability of the Uwemba area for tea is not certain, the Lupembe area is considered to offer favourable prospects for the establishment of a small tea industry. The acreages planted to tea in the Southern Highlands are approximately: Mufindi 4,130 acres; Rungwe 2,950 acres; Uwemba and Lupembe 150 acres. In the Usambara Mountains there are approximately 5,240 acres under tea.

Total production for the Territory reached a new record and there was an increase of some 400,000 lb. in production in the Usambaras. The weather was not particularly favourable, the increase being due to new gardens coming into production. In the Southern Highlands the continued improvement in field practices led to steady increases in yield, but while conditions were good in the earlier part of the year, later dry conditions reduced flushes below normal level, and production was only a little above that for 1955. In addition to the export of manufactured tea, 16 tons of tea seed worth £11,690, were sold to neighbouring territories. This was less than half the quantity sold in 1955.

While little organized experimentation has been undertaken so far in Tanganyika, the Tanganyika Tea Board makes a substantial contribution to the East African Tea Research Institute at Kericho. The Agriculturist of the Research Institute visited the Uwemba and Lupembe areas during November to advise on trials there.

At the end of the year the Tanganyika Tea Board recommended to Government that cesses on manufactured tea and planted acreage should be reduced. This recommendation was accepted by Government.

TOBACCO

(a) *Flue-cured*.—1956 may well prove to have been a landmark in the flue-cured tobacco industry in the Iringa District. This season saw the first large scale change-over from the old Amorello strain "Ehlers" to Virginia type leaf. While rather too large acreages were attempted for a crop which needed more careful management than Ehlers in all phases of production, and while the season was a difficult one, with badly distributed rainfall and sunless conditions, the results were quite encouraging although yields per acre were low. In addition to the mistake of attempting too large acreages in the first season, the other chief mistakes were in incorrect handling and over-conditioning. Of the total licensed area of 5,847 acres, 1,475 acres were planted to Virginia tobacco. At the end of the year the transplanting for the new season was well up to schedule. 6,247 acres were licensed of which 3,696 acres were intended for Virginia leaf. Production figures for all areas are shown in Appendix II.

A large part of the credit for the success so far achieved must go to the work of the Tobacco Research Officer at the Tobacco Board's research station at Seatondale. In order that adequate advice and assistance might be given to growers of the new crop an experienced tobacco officer was also stationed at Seatondale for extension work.

Despite some restriction of the acreage planted to Ehlers, in order to keep within the quantity which the East African Tobacco Company had contracted to buy, the crop exceeded expectations and the contract quantity, and the selling agents had not been able to dispose of the surplus by the end of the year. A quota system was imposed for the new season to keep production within the bounds of the contract.

Results from the first year's trials of Virginia tobacco in the Chunya District were very encouraging. There would appear to be considerable areas of land suitable for the production of flue-cured tobacco in that District, but it has the disadvantage of being far from centres of communication and the value of developing tobacco growing in that area will have to be assessed in the light of other areas of possible expansion. Yields from the trials were low due to late planting and a poor season, but 2,494 lb. of leaf were produced and sold at an average price of Shs. 4/54 per lb.

It was generally a good year for flue-cured tobacco in the Western Province where production was more than doubled and exceeded a half million pounds. While the overall average yield was low, yields up to 776 lb. of cured leaf per acre were obtained. Production on the Tanganyika Agricultural Corporation and tenant farms at Urambo accounted for 65 per cent of the crop. There was an encouraging expansion of the African green leaf industry, run by the East African Tobacco Company, which distributes seedlings and buys green leaf. 330 growers, treble the number in 1955, grew 103 acres and received an average of Shs. 48/- for their leaf. There is room for improvement in the yield which remained low. Some leaf was also cured for Africans by a few European growers elsewhere in the District and they were appointed agents for the East African Tobacco Company for the coming season, to supply seedlings to, and to purchase green leaf from the growers.

With the exception of two estates in the Songea District of the Southern Province, flue-cured tobacco production in that Province showed few signs of strength. The success of flue-cured tobacco on the Songea estates and the potentially higher return from this type of tobacco has encouraged a few Africans to turn from fire-cured to flue-cured tobacco. Nine bales were produced and sold through the co-operative society. One of the estates started a green leaf industry with which growers were satisfied. In view of the highly specialized nature of flue-cured production a general change-over to this type of tobacco is not advocated but every assistance was given to those who decided to try their hand at it.

Rosette disease was a serious problem in some estates in the Southern Highlands Province in 1956 due to poor observance of good plant sanitation. There was also widespread and often severe aphid infestation in the control of which the use of malathion was encouraged.

(b) *Fire-cured*.—There is a steady demand for this type of tobacco both locally and overseas and production within the Territory could be expanded with safety. It is not easy, however, to sustain the interest of Africans in the crop in some areas. Low returns to the grower due to low yields and the small individual acreage grown, are all adverse factors, particularly where the crop is in competition with present high priced crops such as coffee and cotton.

However, in Kibondo there is no competitive cash crop and the number of growers showed a further increase this year, which, combined with a favourable season, led to a considerable increase in output. The crop has also spread on a small scale to parts of Kasulu District. Fresh seed was imported from Nyasaland with a marked improvement in the crop generally. One disturbing feature for the future of this industry was the growing shortage of fuel in some places, where curing was carried out with difficulty.

In Biharamulo and Ngara there was a small increase in the number of growers, despite the loss of some growers to cotton cultivation in the east of Biharamulo, but the crop was only about the same as in 1955. This tobacco, and that from Kibondo, was sold through the Nyamirembe Native Tobacco Board. For some years past mention has been made in this report of the large quantities of tobacco from Kibondo and Ngara which is sold as coil. There has been no accurate figure for sales in the past, but in 1956 all coil sold in Kibondo had to pass through Native Authority markets, and 170 tons were so marketed, rather more than was sold as cured leaf.

Production in Songea District continued at a disappointingly low level, with no signs of a recovery in popularity of the crop. Only 292 tons of leaf were sold through the primary markets and the factory out-turn was only 215 tons, compared with 318 tons in 1955. The quality of this year's crop was slightly below that in 1955, only 29.4 per cent of the leaf being Grade I. Conditions were not favourable to the crop, heavy rains destroying seedbeds and leading to poor growth in the field. But there is little doubt that the real cause of dissatisfaction with the crop lay in the poor returns to growers, which in turn could be attributed to the exceptionally high overheads of the marketing Board which cured and marketed the crop. Steps were taken by the co-operative which took over to reduce these overheads and the factory was run for the first time without an European manager. It remains to be seen whether the Union will be able to continue to pay sufficiently enhanced prices to encourage

a return to production of the crop. Individual production could be increased by more careful work in the field and by the adoption of manuring, trials having shown the value of both goat manure and sulphate of ammonia in increasing yields.

The best grades of Songea tobacco are used in the shag trade and there has been some criticism of the type of leaf which is now being produced. It is probable that careful selection within the old Songea strain will give better results than the importation of strains from Nyasaland, the leaf of which is not considered as suitable to the buyers of Songea leaf.

This season there was no large scale recurrence of leaf curl virus which did so much damage to the crop in 1955.

WATTLE

In view of the continued progress of wattle planting in the Territory, and of its eminent suitability as a productive crop in mountain slopes too steep for arable cultivation, the growing anxiety in the major producing countries regarding possible over-production of wattle came as a disappointment. An agreed production quota scheme has been arranged between South Africa, Rhodesia and Kenya, but this Territory has not yet been required to enter it. It is obvious, however, that some care will be necessary in further extension of planting in the Territory.

In the Usambara Mountains, it has been part of the rehabilitation scheme to plant wattle on badly eroded steep hillsides, retired from arable cropping and grazing. Planting was further extended this year and it has also been encouraged in the steep Pare Mountains. The quantity of bark marketed in the Usambara Mountains was only half that of the previous year, when high prices encouraged the cutting of a quantity of immature trees. A small tannin extract factory has been completed in Lushoto, and progress was made with the introduction of a grading system with a view to improving the quality of the bark.

Good prices from first sales of bark in the Uluguru Mountains have stimulated African interest in the crop there.

The Tanganyika Wattle Estates, an enterprise of the Colonial Development Corporation, continued the construction of its tannin extract factory, and completed the planting programme, which brought the total area under wattle to 35,000 acres. Some 95 tons of bark were supplied to the Company's choppery by non-native farmers in Njombe, and 275 tons of bark were sold by Africans. Satisfactory progress continued to be made in the Bena Wattle Scheme, a Native Authority Scheme, from which bark will be processed in the Tanganyika Wattle Estates factory. Rather over 4,100 acres were taken up by Africans at the end of 1956.

There was a setback in the largest potential area of the Bena Wattle Scheme, where a form of "dieback" developed believed to be due to a boron deficiency. In the Usambara Mountains there was a satisfactory decrease in the scale insect, *Iserya purchasi*, following the introduction from South Africa of the lady-bird, *Rhodolia cardinalis*.

WHEAT

For the second year running growers of the main-rains crop of wheat in the Northern Province had a disastrous year. This year, although rust damage was much less than in 1955, the severe drought affected all the centres of production, often leading to total failure of the crop. Wheat growers in the Ol Molog district of Moshi are more favourably placed than other growers as they are able to take two crops a year, and they harvested an excellent short-rains crop.

It is not unlikely that there will be some reduction in the acreage planted to wheat in the coming season, as farmers have begun to doubt the future of wheat growing with the present strains. Although losses through drought have been rather more frequent in recent years, black stem-rust outbreaks are the greater danger. While rust-resistant wheats bred in Kenya have been the mainstay of the Tanganyika industry in the past, the emphasis on wheat breeding there is now on varieties for rather higher altitudes than occur in Tanganyika. There is need for varieties bred particularly for the lower and somewhat drier conditions of the Northern Province and this work is planned to start in 1957, in close co-operation with the Senior Plant Breeder of the Kenya Department of Agriculture.

Following some successful small scale trials of wheat in the Mbozi area, and a visit made by the Senior Plant Breeder, Kenya Department of Agriculture and a representative of Messrs. Unga Ltd., several farmers made trial field-scale plantings this year. The results were promising and yields averaged 4.5 bags per acre. In view of the remoteness of the area from the mill at Iringa, higher yields will be necessary if wheat planting is to be an attractive proposition. It is thought that these may be obtained by good cultural operations and by the use of fertilisers.

Wheat is a more suitable crop than maize in the highland areas of Njombe District and African production there increased. The crop is growing in popularity as a staple and the greater part of the production was consumed locally. It is unlikely that any considerable part of this production will find its way to the mill at Iringa as the economic price which can be paid is considerably less than the local value for barter as a staple. Seed of improved varieties was distributed.

The only other centre of appreciable production is in the Matengo area in Songea District. The crop is African grown and is also increasing in popularity as a staple. A good rust-free crop was grown in 1956 and a large proportion was bought by a local Mission for milling. It is also unlikely that there will be any appreciable export of grain from this District, as the growers' opinion of price does not compare with the economic value of the crop.

Small areas of wheat are grown by Africans in the mountains of the Eastern Province and in the western highlands, and there was some increase in production. Part of the crop was consumed locally, but some was sold to traders for domestic grinding for wholemeal flour.

V.—MINOR CROPS

BARLEY

Small quantities are grown on estates in West Kilimanjaro where good yields are obtained. Some is of sufficiently high quality for malting. Barley also grows well in the Poroto Mountains of Mbeya and African production expanded to approximately 80 tons, stimulated by local demand for pig feed.

Cacao.—Encouraging progress was made in developing the new estate at Maramba in the Tanga Province. Experience in the past dry year defined more clearly the limits of suitable soils. While new plantings suffered from the drought the well established plants of 1955 withstood the dry conditions well. In fact, second year trees made exceptionally good growth and formed some pods. Three tons of beans were exported from the only other estate, but most of its production was sold to Maramba for seed.

Chillies. There was some increase in acreage in the Tanga Province where 4 tons were exported. There was also a small production in scattered estates in parts of the Northern, Eastern and Central Provinces.

Derris.—The one estate producing this crop in Tanga Province produced 6 tons of root, a further increase on previous production. The demand was poor and the price was low. However, the strain of derris available for planting in Tanganyika has a very high rotenone content and this crop offers limited possibilities where conditions are suitable.

Essential Oils. There was a further decline in production during 1956. As was pointed out in last year's report, the markets are highly selective, and Tanganyika oils have to compete with well established industries which have developed under optimum conditions for the oils produced. Bitter-orange oil alone is produced in any quantity, but the dry season reduced yields and only 5,500 lb. were marketed, compared with 8,000 lb. in 1955. There was a considerable reduction of the acreage under geranium owing to the lack of demand. In view of good local demand for eucalyptus oil a grower has decided to extend his present area of 5 acres; 80 lb. of oil were sold during the year.

Fruit.—There is a considerable production of citrus fruits, mainly oranges and limes, in the coastal belts of the Tanga and Eastern Provinces, particularly within easy reach of Tanga and Dar es Salaam. While a large part of this production finds a ready market as fresh fruit, fruit juice production in Dar es Salaam and at Muheza in Tanga Province absorb considerable quantities of oranges, while the factory at Muheza also cans pineapples and grapefruit.

The orange crop in the Tanga Province was severely reduced owing to drought and only some 1,532 tons were sold, compared with 2,140 in 1955. Of this production, 1,000 tons went to Mombasa and Nairobi, the remainder being taken by the Cannery at Muheza for juice production. Prices were rather higher at Mombasa than last year, and varied from £5 to £9 10s. per ton. Kenya is the only market for production surplus to the factory's requirements, but demand in Kenya recently declined considerably, and there may be difficulty in future disposal of this surplus.

The outlook for grapefruit production, however, is good. Forty tons were sold for canning at Muheza this year and demand is greatly in excess of supply. It had been hoped that there might be a future for the export of grapefruit as whole fruit, but market research showed that the crop season coincides with that of established large scale producers and it is unlikely that this development will take place. However, the quality of local grapefruit is good, and there should be scope for further development in canning.

The Cannery at Muheza also bought 60 tons of lemons for production of candied peel and for export of skins preserved in brine.

The demand for fresh pineapples leaves little scope for expansion, and increased production can only be expected where conditions are favourable for producing a fruit suitable for canning. Experiments at the Coast Agricultural Station indicate that this is unlikely on the coast, but the soils and climate around Muheza are promising. Increased planting took place in that area, but the full demand for suckers could not be met. The existing small scale cannery took up the surplus crop, but its operations are not yet on a sufficiently large scale for future prospects to be assured. Production is mainly in the hands of African growers all of whom used fertilizers in accordance with the results obtained on trial plots.

In Lushoto production of African-grown passion-fruit for sale to a local factory for juice extraction was doubled, and 160 tons were sold. Difficulties were encountered, however, in marketing the canned product, particularly as the main demand lies in Australia where import restrictions were imposed.

The tomato canning enterprise in the Northern Province closed during the year but there has been a small production for canning near Muheza. Although trials of varieties of tomatoes for canning in various parts of the Territory indicated that good quality crops might be grown, it is unlikely that it would be possible to compete with Italian canned tomatoes on the British market, where this article is landed extremely cheaply. It is more likely that any local industry would have to concentrate on the production of juice and puree to be successful. Unfortunately there are a number of disease and pest problems which might well prevent the economic production of tomatoes on any large scale.

Deciduous temperate fruits, produced in some mountain areas, suffer from periods of glut. Peaches and plums are the main fruits grown, but very excellent apples are produced on a small scale in the Southern Highlands and Tanga Provinces.

The only bananas grown for export are produced in Pangani District and the main market is in Mombasa. This industry has been suffering from the competition of Kenya grown fruit, but there was a better demand from Kenya this year, and the crop and prices were good. Elsewhere in the Territory bananas are an important food in the wetter areas. In the Usambara Mountains, where steep land which has been withdrawn from arable crops has been planted with bananas, there was further increase in production and a ready demand for the fruit. While there has been no serious spread of "Panama Disease" in the Moshi District, infected plants continued to appear and organized field sanitation was maintained. There were isolated outbreaks near Muheza and in the Nguru Mountains in Morogoro District.

Vegetables.—European type vegetables can be grown successfully almost anywhere in the Territory for part of the year, given adequate water supplies and careful husbandry. Major production, however, is concentrated in the highland areas, but even there difficulties are experienced in maintaining an even supply of good quality produce throughout the year. There is an ever increasing demand for vegetables in the larger centres of population and even towns such as Iringa and Mbeya, near to good production areas, suffer from insufficient supplies at times. There is therefore scope for the increased production of vegetables in carefully chosen areas with reasonable communications to the main consuming centres.

For some years Dar es Salaam has relied to a large extent on vegetables produced in the Western Uluguru Mountains, the marketing of which has been organized through two Co-operative Societies. The industry has suffered many difficulties in the marketing of its produce and growers have shown little effort to improve quality. There was a sharp decline in production in 1956, ascribed mainly to the low prices paid to the growers, which averaged only some 35 cents per kilo, compared with prices charged in Dar es Salaam ranging from 60 cents to Sh. 1/- per lb. for such items as cabbage, carrot, green beans and cauliflower. The industry in the Southern Highlands also sends considerable quantities of vegetables to Dar es Salaam, as well as to the Lake, Western and Southern Provinces; production at 300 tons showed no increase on previous years.

Vegetable production by Africans in the Western Usambaras has shown a very great increase in the past two years, following the rapid spread of terracing and irrigation introduced to a few progressive growers as part of better land use methods under the Usambara Rehabilitation Scheme. There is a large market for vegetables on sisal estates and in Tanga, but the increase in production has been such that during the peak months growers had some difficulty in disposing of their produce this year. Trials have been designed in an effort to demonstrate methods by which production can be evened out.

There is a flourishing vegetable industry on Kilimanjaro, but the market is somewhat limited. In addition two farmers in the Northern Province are specialising in market gardening.

Potatoes.—The production of European potatoes is almost entirely an African industry but some estates have shown interest in the production of high quality potatoes in the Southern Highlands Province. The main markets are Dar es Salaam and Tanga, which are supplied largely from the Eastern and Southern Highlands, and the Usambara Mountains respectively.

Potatoes are an important crop in the Poroto Mountains where it is estimated 7,000 tons were produced and in other highland areas of the Southern Highlands Province where they form an important part of African diet. Good crops were obtained but as usual there was considerable wastage due to over-production. Nevertheless, demand was better and prices were higher this year.

Potato Blight (*Phytophthora infestans*) has been the most serious cause of poor productivity for some years past. With the co-operation of the Scottish Plant Breeding Station it has been possible to test blight resistant strains which they have developed. This work has gone on for some seasons and the most promising strain, 1521c(3), is being bulked in the main potato districts for distribution to growers. This potato has proved very popular in the Usambara mountains and demand for seed has exceeded supply.

Onions.—Onions are a popular African crop in many parts of the Territory, the most important production coming from the Northern Province, where there was an increased interest in the crop in Arusha. There was also increased production in the Central and Southern Highlands Provinces. The chief problems affecting this crop are the related ones of storage, to even out supplies, and marketing.

Gums.—The quantity of this wild product collected is generally in inverse proportion to annual crop production and forms a very useful source of income in years of low rainfall. While collection was lower in the Western and Lake

Provinces, the generalization did not hold in the Central Province this year, where collection increased. Traders continue to seek the assistance of the Department in improving the quality of the gum offered for sale. While it is the policy of the Department to encourage collectors to improve the quality of their product, this effort is largely wasted as long as the traders themselves subsequently mix the different grades and do not offer attractive premia.

Rubber.—Tapping recommenced on the only plantation of *Hevea* rubber in the Territory. This is an old estate which was planted prior to the first World War. Nine tons of smoked sheet were produced.

Kapok.—While the greater part of the kapok produced comes from estates in the Eastern and Tanga Provinces, there has been increasing interest in the crop among Africans and new planting took place during the year. There was also extensive new estate planting. Despite the dry season production was at a very much higher level than for some years past. There was a marked decline in the infestation of the Cerambycid beetle, *Tragiscoschema nigroscriptum*, which did much damage to kapok in Morogoro District during the past two years. This pest, and other species of these beetles, were recorded on kapok and other economic trees in the Tanga Province by Colonial Pesticide Research in 1956.

Oil Palm.—Recorded sales of palm oil and kernels by African smallholders have fallen this year in the main producing area in the Luiche Basin near Kigoma. While it is believed that the production of oil has not in fact been less, the reduction in output of kernels is ascribed to the very laborious work of kernel extraction, each nut having to be cracked individually by hand. Efforts have been made to interest some of the larger producers in mechanizing both the extraction of oil and kernels. After many demonstrations a small oil press has been bought by an African and he is now to purchase a small hand operated cracker. As a result of his satisfaction with the oil press other people are now showing interest in purchasing presses.

Palm oil groves in the Luiche Basin have been neglected for a number of years, forming a vermin breeding ground. A campaign to clean up neglected groves has had some success. In Bukoba, where there are some well grown palms, first attempts to establish new plantings from imported seed were not successful; further efforts will be made. In the Tanga Province palm oil is produced by one estate which has started replanting with improved varieties.

Papain.—After three years of low prices, averaging Shs. 12/- per lb. to the grower, prices rose during 1956 and reached Shs. 18/- per lb. at the end of the year. With this improvement in price there was the usual revival of interest in planting. Papain was only produced by the few regular growers during the year, and came almost entirely from the Northern Province. 17 tons were exported, compared with 37 tons in 1955.

Raffia.—The collection of raffia is confined to the coastal belt of the Kisarawe District and provides a useful cash income in an area where crop production is limited by soils of low fertility. The price has been somewhat lower, at £90 per ton, and the quantity sold dropped from 75 to 52 tons.

Spices.—At the foot of the Eastern Usambara Mountains (and probably in the eastern Uluguru Mountains) there are restricted areas of high humidity where pepper, cloves, nutmeg and cardamoms can be grown. The high price

for pepper corns led to planting by several Africans and trial plots were planted on two estates. Africans also planted a small number of cloves. Nutmeg is produced on a very small scale on one estate; 50 lbs. were sold. The planting of cardamoms by Africans increased near Arusha and trials were started in Tukuyu.

Betel nut.—Planting of this crop along the Pangani River increased and 90 tons were sold. This area is one of the main sources of supply of this product for East Africa, the majority of the crop being exported to Kenya and Zanzibar.

Cinchona bark.—The demand for this product has fallen considerably in past years. It is grown in the Usimbura mountains, and only 11 tons were produced, a third of last year's crop.

VI.—VERMIN AND GENERAL PESTS

Pests of stored products.—The occurrence of Khapra Beetle (*Trogoderma granarium*) was confirmed in Zanzibar early in the year. This beetle is a very serious pest of groundnuts, maize, sorghum and pulses in other parts of Africa, but had not then been recorded from the East African mainland. There is a large trade in secondhand bags with Zanzibar and in order to prevent any danger of the beetle being shipped to the Territory, immediate steps were taken for the compulsory fumigation of such goods and other specified items, either before export or before delivery from ports in Tanganyika. At the same time certain produce from the Far East was also scheduled for fumigation. Later, two small godowns in Lindi were found to be infested with the beetle, but these were satisfactorily fumigated. The need for this action has led to the most satisfactory result that the East African Railways and Harbours Authorities have granted facilities for a fumigation service in the port area at Dar es Salaam.

There are very considerable losses of foodstuffs stored in primitive types of grain bins in African houses. It is encouraging to record, therefore, that as a result of the beneficial effects of dusting stored grain in Native Authority silos in the Central Province, a demand has arisen among the Africans for supplies of insecticide for use in their own grain bins. Sufficient insecticide has been sold during the year to protect the equivalent of 100,000 bags of grain. A demand for insecticide for this purpose is also growing elsewhere. The production of a cheap galvanised bin, for domestic storage is being investigated in the Central Province.

Rats.—Periodic plagues of rats occur in many parts of the Territory and cause considerable losses in cotton, root crops and cereals. While the plague in the Eastern Province was much reduced in 1956, there were outbreaks in the Central, Western and parts of the Lake Province. Poisoning with one of the anti-coagulant poisons has been most successful in towns and villages, but it is too expensive for field use, where barium carbonate baits are used. Systematic laying of baits by a team of trained men in Kilosa has proved the most effective method yet used, the best season for the campaign being between September and January when most crops are off the land and rats will more readily take prepared baits. There is little knowledge of the causes of these periodic rat plagues and at the request of the Agricultural Department, the Biologist, Game Department, has prepared a scheme of investigation which is under discussion.

Game animals and vermin.—The control of game animals, and vermin such as baboon, pig, porcupine and monkey, presents a continuous problem, particularly where the pattern of agricultural production is that of a series of isolated islands surrounded by large areas of bush and woodland. Despite widespread efforts, little effective reduction is noticeable in pig and baboon populations, although in Handeni District the payment of a "tail-bonus" to poisoners has trebled the number of vermin animals killed, and there was a noticeable reduction in the number of baboon troops seen. While some tribes take active steps to hunt smaller vermin, there is a general lack of endeavour, and a considerable staff of vermin scouts is employed by Native Authorities, while Departmental field staff have to spend much time in vermin destruction. In the Lake Province, the South East Lake County Council employs three Vermin Control Officers who are chiefly concerned with the control of porcupine, in which their efforts have been particularly successful, large parts of several districts now having been cleared of this pest.

Control of baboon, pig and porcupine is effected mainly by hunting and poisoning, but the latter method is not popular in some areas, because of fears that the poison may get into wrong hands. Following the successful use of electric fencing by the Game Department Biologist against large game, including elephant, there has been a growing interest in this method of protection. It has been successfully used against elephant in sugar estates in the Eastern Province, with some success against hippo in rice areas, but so far trials against pig in the Western Province have not proved successful. The chief drawback to the use of electric fences is the considerable cost of maintaining clean ground below the wire. Where cultivators are willing to use their initiative fences have been built which have been quite effective against pig.

Grain-eating birds.—The annual invasion of wheat lands on the north-western slopes of Kilimanjaro by Diochs (*Quelea quelea aethiopica*) was not as large as in some previous years, but damage was done to the long-rains wheat crop, although the short-rains crop escaped this year. Damage also occurred in Mbulu District. African grain crops were attacked in most districts of the Central Province, and in parts of the Western and Lake Provinces.

Control operations at two nesting sites, using flame throwers, were very successful, an estimated thirty million birds being destroyed. One colony covered 800 acres and twenty million birds were killed there. Tribal turnouts in the Sibiti Plains destroyed a further five million birds, and there were useful control operations by Native Authorities elsewhere. A notable feature of the early invasions of the Northern Province was that the flocks were composed of 90 per cent old birds; in previous years flocks have contained up to 90 per cent young birds. This may be an indication of the effect of these heavy attacks on nesting colonies. The locally devised flame-bomb method was used for control in a number of roosts when the birds had reached the wheat areas.

Trials were made for the first time using the technique of aerial spraying with parathion developed in the Union of South Africa. These trials were made on a 70-acre nesting site. The trials were not made at the best time, after dark, because of practical difficulties but they gave a fair measure of success, some 75 per cent of the birds being killed. This method may have only limited application in Tanganyika, due to the distances of most known nesting zones from aerodromes, but further trials are to be made when the opportunity offers.

Over 8,500 birds have been ringed in the major outbreak areas in the hope of elucidating the migrations of these pests. A further 1,500 have been ringed in the Lake Province. While no rings have been returned which prove the long distance migration which is believed to take place between parts of the Territory and Kenya, many of those which have been recovered have shown a northerly movement. Other interesting recoveries have been made from birds recaptured a year later in the same areas where they were ringed, although the normal annual movement from those areas had taken place in the interim.

While birds bred in the Central Province had largely left the Province by the end of May, as far as is known for the north, large numbers appeared again near Dodoma in June and July. By August numbers had dropped once more, but observations by the Zoologist suggest that not all birds leave the Central Province during the dry season. Mr. Vesey-Fitzgerald of International Red Locust Control Service, reported a 30-acre breeding colony in the Rukwa Valley, and the part which these birds play in the general pattern of migration within the Territory has yet to be worked out. New breeding sites were also discovered in suspect areas in the Bohoro flats north-east of Mbeya, but again the movements of these birds is not yet known. Some evidence was obtained of double broods in the main nesting season in 1956, both in Rukwa and the Central Province, where favourable conditions for nesting were prolonged.

The Zoologist conducted some large scale experiments on caged birds, in co-operation with Dr. A. J. Marshall of St. Bartholomew's Medical School, London University. These experiments have been designed in an attempt to discover what factors in the birds' environment bring about nesting.

VII.—SOIL AND WATER CONSERVATION

The Mechanical and Survey Services in the Northern Province worked on a somewhat reduced scale this year, but the value of mechanical work done during the last half of the year was nearly as great as that for any previous twelve months. The service was re-organized, the units being put under the control of a Senior Field Officer in place of an Agricultural Officer. The latter will concentrate on Farm Planning on estates and this post was filled at the end of the year. The total value of works completed by the service during 1956, which are set out below, was £20,022.

Terracing	794	acres
Diversion ditching and training banks	4½	miles
Dams, hafirs and night storage tanks	11	

With the increased emphasis to be placed on farm and land use planning, a greatly increased effort was made in training African surveyors. At the end of the year 45 trainees had been brought up to a very high degree of proficiency, many of them being capable of turning out a plane table contoured survey with a high degree of accuracy. The hazards attendant on survey work were, however, illustrated by the fate of a group of three trained pack donkeys which accompanied one survey party. These were consumed one night by a pride of eight lions within close earshot of the surveyors in an adjacent tent!

An appreciation of the need for soil conservation has developed slowly among farmers in the Southern Highlands Province, but a nucleus of those who firmly believe in it now exists in each of the settled areas. A mechanical

unit was established at Iringa in the latter part of the year which considerably increased the assistance which this Department can give, and should lead to a general speeding up of all conservation work. Very satisfactory work was accomplished in the short time the unit was operating and there was a growing demand for terracing.

Unfortunately, with but few exceptions, the African peasant does not yet appreciate the need for the adoption of measures to conserve his soil, or for the balancing of livestock numbers with available grazing. This lack of appreciation is not confined to the peasant only, and propaganda for soil conservation meets with opposition here and there from local politicians, and even from District and Rural Councils.

It is unfortunately not always realized by the extension officers themselves, to say nothing of the farmers, that soil conservation is merely one aspect of better land use and increased productivity; it is not an end in itself, and should never be regarded as such. It is not surprising that peasants and others show little enthusiasm for hard or expensive work which produces no immediate effect. In fact, earth-moving exercises are of no value, and may be positively harmful, if they are not accompanied by changes in methods or systems of farming the land. The fanatical but impractical conservationist is almost as great a menace as the land miner. It is therefore essential that the methods advocated shall not only conserve soil and water but shall also produce visible effects in a short period.

In the Lake Province, work continued to be focused on the increased use of tie-ridging in Sukumaland, and of strip cropping in North Mara; on gully stopping and the rehabilitation of overgrazed land by temporary closure to grazing; on the construction of contour banks in grazing land, and on the control of cattle-track erosion. There was a welcome return to tie-ridging and manuring in Sukumaland after the severe setback when rules were relaxed. In several areas where land was closed to grazing there was the most encouraging recovery in grass cover. On Ukara Island, where there is a very dense population, and where the good local methods for soil and water conservation were proving insufficient, the scheme for gully-stopping and contour-banking in grazing land began to show obvious benefits in improved grazing and more permanent streams.

Demonstrations of soil conservation methods in the Western Province successfully showed their value. There was some progress in the better alignment of ridge cultivation and in tie-ridging, but the adoption of improved methods is likely to be slow in some of the highland parts of the Province where the people are particularly conservative in their outlook.

Both in the Western and Southern Highlands Provinces the increasing use of the ox-plough and the cultivation of larger blocks of land, has increased the dangers of erosion. The single mouldboard plough is generally used, but where ridging ploughs have been used in the Southern Highlands Province, insufficient protection is achieved without the additional labour of tie-ridging. A similar problem exists in the Northern Province where several farms of over 100 acres have been developed by Africans using tractors or oxen. One or two of these farmers, however, made a start with the construction of conservation works.

Further progress was made in Moshi and Arusha Districts in the conservation of African lands and there was a general increase in contour hedge planting, the establishment of permanent crops on steep slopes, and in other desirable measures of conservation. Some opposition developed in parts of Mbulu District to trash bunding, which is the chief method of conservation practised there. This was due to the opinion that the accumulation of maize stover in the bunds had resulted in increased stalk borer damage. As this may well be the case, it is intended that the rules relating to trash bunding shall be relaxed in limited areas after the land has been adequately protected by other means.

The attitude of the people towards soil conservation, grazing control and the preservation of forest cover in catchment areas in parts of the Southern Highlands Province is most unsatisfactory. If the present practices continue, the future of potential irrigation in the Usangu Plains could be jeopardised and established industries will suffer. Progress was particularly slow in Mbeya and Rungwe Districts despite constant supervision and propaganda. The preservation of the soil in the Porotos Mountains is vital to the future livelihood of the people in this densely populated area. In Rungwe, efforts to improve soil conservation still meet with considerable opposition. However, a further 40 miles of contour banks were completed this season. In Njombe District the position is somewhat better and there was very satisfactory progress in two schemes. In the Wangi-ngombe area, a catchment area of some 5 square miles was completely contour banked, and a number of low barrier dams were completed in the headwaters of the Wangi-ngombe river system. In another area, trees were planted to protect valley sides and the people undertook to continue this work in the coming season.

The evacuation of part of the Mbeya Range, where bad land use was interfering with the water regime, was completed during the year and a forest reserve will be created. Part of this area was selected by Dr. Pereira of the East African Agricultural and Forestry Research Organization as one site for catchment area research which has been planned to take place in the three East African Territories.

Good progress was made with the first phase of the plan to conserve and improve the scanty water supplies in the Mbozi area. Springs were enclosed and reservation of the river catchments nearly completed.

In the cattle areas of the Central and Western Provinces considerable damage to the land has been done over many years, due to too heavy stock populations and to lack of well-distributed watering points. It has been part of the work of field staff of this Department to assist Native Authorities in the planning and construction of small dams and hafirs and this assistance continued during the year. In the Central Province like others there is a tradition for the people to turn out to do communal work of general value to the community, and much of the construction of dams and hafirs there has been on that basis. This traditional work is particularly of importance where Native Authority revenues are low, or have to face heavy expenditure at frequent intervals to combat famines. Unfortunately in those very areas local authorities have been showing less and less interest in maintaining the turn out, and many works started in the Central Province this year had to be left uncompleted because of insufficient labour. If this traditional form of self-help is allowed to die out, the programme of improvement of water supplies can only be very seriously curtailed, as local

revenues could not possibly meet the cost of paid labour to do the work which has been achieved in past years. The programme of contour banking in several parts of the Central Province continued on a smaller scale than in the past and was also affected by labour shortage.

The reduction of stock numbers to within the management capacity of the land remains a major problem. Past efforts based on a percentage reduction annually have not shown appreciable lessening of numbers. However, there were two significant developments in this direction during the year. In Nzega District the Native Authority realized that sufficient progress was not being made and voluntarily raised the percentage culling rate. In Kondoa, a new and ingenious system of stock tickets was devised and accepted by the people. Briefly, this system requires an appreciation of the arable land necessary to support the people in a village area, and of the number of stock which can be carried on the remaining unimproved pasturage. The number of stock in the area is reduced by transfer to the development area, or by sale, to that number and transferable stock tickets are issued to stock holders to the maximum permitted figure. By this means the total stock in the area will remain at or below the estimated capacity of the pasturage.

The second meeting of the Eastern African Regional Committee for the Conservation and Utilization of the Soil was held at Dodoma in early July under the Chairmanship of Dr. E. W. Russell. This was attended by delegates from the Belgian Congo, British Somaliland, Madagascar, Mauritius, Ruanda Urundi, Tanganyika, Uganda and Zanzibar. Dr. Ross, Permanent Secretary of the Southern African Regional Committee, and an observer from Kenya also attended. The main theme of the meeting was soil conservation in peasant agriculture, and the results of a field exercise carried out by the delegates in a seriously eroded part of Kondoa District provided the main background to discussions.

VIII.—IRRIGATION, LAND USAGE AND SETTLEMENT SCHEMES

Reference has been made in Section I of this report to the important part which irrigation will play in increasing the productivity of this Territory. African cultivators have developed the use of irrigation by primitive methods in many places in the Territory, but the planned use of water combined with planned settlement is new to Tanganyika. Much will therefore have to be learned about the best system of cropping and the application of water, as well as on the best methods for organizing the settlement of people on the schemes. Where the water supply is small and the irrigated area will be only a few hundred acres, it is envisaged that the local authorities will administer the scheme. It is hoped, however, that in the case of large schemes, once initial investigation has shown that economic prospects are good, the Tanganyika Agricultural Corporation will take over the development and management of the scheme, along lines akin to those of their Tenant Farming ventures at Nachingwea, Urambo and Kongwa.

Good progress continued to be made with the major irrigation survey project in the Rufiji Basin. This is being made by experts of the United Nations Food and Agricultural Organization under the management of the Tanganyika Agricultural Corporation, and financed partially by the Organization and from the territorial allocation under Colonial Development and Welfare. Three trial

farms, one in the Usangu area of the upper reaches of the Great Ruaha River, one near Ifakara in the Kilombero Valley and one in the Ruffiji Valley, were opened, and irrigation trials were planned.

Many other areas of potential irrigation development were under survey and investigation by the Department of Water Development and Irrigation and this Department, particularly in the Tanga, Western, Central, Northern and Southern Highlands Provinces.

A further stage was reached in the development of two major irrigation schemes in the Central Province, where the aim is to integrate irrigation farming with the more general dry land farming of the surrounding areas. Both these schemes are based on large dams, one of which was in existence, and the other was built by the Water and Irrigation Development Department during the year. Trial farms were opened at each place, machinery was obtained and buildings for staff erected. Owing to unavoidable delays in the completion of the main canals it was not considered advisable to start planned experiments at the end of the year, but observation plots were planted.

Of the schemes which have reached the settlement stage, a very encouraging change in attitude by the people towards that at Mlali occurred. The disinterest shown in the first year was replaced by active enthusiasm and there was a waiting list of 70 for land there. Another satisfactory feature was that cultivators on the scheme gave precedence to work on their irrigated land, in preference to their dry land fields. The new Uru Chini scheme in Moshi District did not get under way owing to a lack of understanding of the method by which the water was planned to be distributed to and within the plot. The economic use of water demands methods and skills which differ from the old extravagant practices. Crops on the Department's demonstration plot gave excellent yields.

Not only is there a need for the careful planning of new irrigation schemes but, if new settlements for dry land farming are to be fully productive, land use plans must also be carefully made prior to their development. The policy of the Department is to build up four land planning teams which will work from the four Regional Research Centres, each team composed of an Agricultural Officer, Surveyor and survey assistants, and a Chemist. The first Agricultural Officer (Land Planning) was appointed during the year and carried out a more definitive survey of parts of the 1,100 square miles in Handeni District, which were extensively surveyed in 1955, with the object of finding an area suitable for planned Tenant Farm settlement, to relieve population pressure in the Usambara Mountains. The later survey showed that the terrain was not suitable for this type of development, while the provision of water supplies might be difficult and expensive. Future development will take place near to the few existing water supplies and will be on smaller-scale holdings. The same officer was one of a team which surveyed and reported on the lower areas of Moshi District, with particular reference to the possibilities of increased settlement there.

Reference was made in the last year's report to a scheme at Malya in the Lake Province, to integrate irrigation with dry land farming. Unfortunately, for financial reasons, it was not possible to start that scheme which was to have been based on the tenant farming principle, each farm following a different system of husbandry, aimed to answer some of the problems which will arise from enclosure and individual ownership. It is hoped that development will be possible in the coming year. It is of interest to note that yields of paddy under irrigation at Malya averaged 3,154 lb. per acre.

Four new areas were opened for controlled settlement in Geita District during the year. While holdings are not planned, the number of families and stock admitted to a new area are limited. The development of Geita District by settlement from the over-crowded areas of Sukumaland has been spectacular and this District now produces one third of the Territory's cotton crop. A similar balancing of human and stock population to the area available has been adopted in the Kondoa Irangi resettlement area where, due to lack of control, the earlier settlements were reaching a stage of overcrowding similar to that of the Highlands. Considerable tsetse clearings took place during the year, together with the provision of water supplies, and will absorb 6,000 head of surplus stock from the Highlands in the coming year.

The Tenant Farming Schemes run by the Tanganyika Agricultural Corporation had a more successful year than in 1955 and there were further extensions. Tenants at Kongwa had a particularly good season and the best earned profits up to Shs. 3,700/-. This scheme is now being reorganized to include cattle.

There was another year of good progress in the land usage scheme in the Usambara Mountains. Signs of the satisfactory execution and general acceptance of the methods of better land usage which have been advocated were increasingly visible, despite some short-sighted political agitation against the observance of the Native Authority rules governing land utilization. Prosecutions for non-compliance with the rules decreased to negligible proportions. In addition there has been a spectacular increase in voluntary terracing of irrigated vegetable gardens and in the building of cattle byres for stall-feeding. Even where byres have not yet been built a considerable proportion of the stock is now tethered and hand fed. The following figures demonstrate the progress which has been achieved:

	1954		1955		1956
Total number of strips planted to perennial crops ...	27,484	...	44,920	...	64,250
Total acreage of tie-ridging	26,029	...	41,920	...	55,370
Total number of people who have terraced the whole of their irrigated gardens	482	...	2,038	...	6,626
Number of byres built annually for hand feeding stock	196	...	532	...	1,043

Progress in the pilot Land Utilization Scheme in the North Pare Mountains, which was started at the request of the people as a result of the success of the Usambara Scheme, was most encouraging. The area of the original pilot scheme was extended during the year and matters have gone very smoothly; during the year it was not necessary to take a single prosecution under the local cultivation rules.

In contrast, in the Uluguru Mountains, where the Land Usage Scheme was brought to a standstill following tribal unrest in 1955, there has been little improvement in the attitude towards soil conservation measures in the Eastern part of the mountains, and large scale indiscriminate burning occurred on the hillsides. Nevertheless, it is interesting to record that a few cultivators are so convinced of the value of conservation methods in producing better crops that they persist in using them. These holdings should provide fine focal points when confidence has been regained by concentrating on aspects of husbandry, such as coffee pruning, wattle culture and tree planting, which are not directly connected with conservation rules.

The improvement of agricultural production in the settlements formed to combat sleeping-sickness in the Western Province continued to receive attention, but the problem of raising the cultivators above their present subsistence level is not an easy one. The planned expansion of the settlements to enable cattle to be kept and the introduction of cash crops are two basic needs for the future.

IX.—MECHANIZATION

The successful large scale production of wheat during the war by the Northern Province Wheat Scheme, and the inception of the Overseas Food Corporation's plans for the mechanized production of groundnuts, quickened interest in the application of mechanical power to increase African agricultural production. Numerous contract ploughing schemes were started by Government and Native Authorities to demonstrate to the African the value of mechanical cultivation. These schemes were generally based on one or two small tractors only. In no cases have any of them been financially successful. Without close supervision the machinery rapidly came to a standstill; with close supervision the overheads were very high, while the scattered nature of the work in so many cases added further to the costs of operation. Economic charges for ploughing have proved to be unacceptable to the cultivators and one by one the schemes have been closed down.

In last year's report the closing down of the Native Authority scheme in the Rufiji was foreshadowed, and it was wound up in 1956, with the disposal of all its machinery. The Rovuma Valley tractor ploughing scheme has also been closed; experience in the past two seasons has shown that until adequate flood protection works are provided, the cropping of this area is too hazardous. The Lake Province scheme also is unlikely to continue ploughing next season.

Although these and other, schemes have not been financially successful, they have done much to arouse interest in mechanization among African cultivators, resulting in a steady increase in the purchase of tractors by Africans for use on their own land and for ploughing for their neighbours. In the Rufiji the three ploughing associations formed by groups of Africans have entered their second year of operation and three more are in view. None of these associations is yet on a financially firm basis, although performance has been varied and one society has carried out its work quite efficiently. All started with insufficient working capital. There has also been a strong antipathy to taking advice. Every effort is to be made to guide new societies in the raising of their capital, in management and accounting, and in their choice of equipment, for it is believed that this form of organization is likely to prove one of the most promising ways of bringing mechanization to many areas.

Unfortunately among the growing number of African tractor owners there are many who know little about their machines or their maintenance. It is becoming an important part of the Department's field duties to see that such men are helped to overcome their difficulties, and the mechanization scheme based on Malwa in the Lake Province is pioneering this type of work. Repairs are made, a spares supply is available, and tractor drivers are trained. Courses were also run in conjunction with a well known tractor firm to instruct field staff, local chiefs and tractor owners in tractor maintenance and in the problems of mechanized farming.

The costs of a ploughing service are considerably increased by having to operate on scattered small fields, but efforts to obtain aggregation of holdings for block ploughing in the Lake Province mechanization scheme have met with very little success. Opposition arises from tradition and, in some cases, from political activities. The acreage ploughed in 1955 was greatly reduced by initial insistence on large planned blocks, and the scheme was forced to return to ploughing smaller areas, charging the cultivator with travelling time. 968 acres were cultivated compared with 2,468 in 1955. Charges remained at Shs. 45 - per acre for ploughing, but Shs. 32 - per hour is now charged for travelling time. Further work on costings shows that the cost of ploughing was Shs. 76 - per acre, including the overheads of the off-season, and all other charges, including depreciation.

Personnel of the newly formed National Institute of Agricultural Engineering East African Unit arrived in Kenya in October. This Unit, which is being financed for three years by a Colonial Development and Welfare grant, will be concerned with the testing of agricultural machinery with the object of defining some of the many mechanical problems in tropical agriculture. It will not be concerned with research projects, but purely with machinery testing. While the Unit will have its base in Kenya, and will be administered by the Director of Agriculture, Kenya, it will spend part of each year working in Tanganyika.

The main effort in mechanization research was aimed at solving some of the problems of seed cotton handling, which arise from serious labour shortage during the cotton marketing season. Promising developments were made with a lorry body suitable for carrying compressed seed cotton in bulk; and with a baler and a bagging machine for seed cotton.

In discussing mechanization with reference to African agriculture there is a tendency to think only in terms of tractor power. The application of ox-power in cattle areas can make a very valuable contribution to increased production and, in view of the low costs of this power, it is often economically less hazardous than the use of expensive machine power in areas where low probability of good rainfall leads frequently to poor crops, or even to total failure. The use of the ox-plough continues to expand in parts of the Lake Province, Western Province and in the Southern Highlands Province, while there has been a satisfactory sustained interest in the communal ox-ploughing and ox-training scheme in Mpwapwa. It is also satisfactory to note a slow spread in the use of ox-carts for manure carting in both the Lake and Western Provinces. The widespread extension of their use would be a most important contribution to increased productivity there. Attention is also being given to the testing and improvement of small mechanical aids for the peasant.

GOVERNMENT FOOD FARM

For the first time since it was opened in 1951, the mechanized rice production farm at Lupiro and Kivukoni in the Kilombero Valley, showed a heavy loss on its operations. Although over 800 acres had been prepared for planting, the heavy rains of January and February prevented the planting of more than 240 acres. Very serious flooding from the Kilombero River and damage by hippopotamus severely curtailed this acreage and only 62 tons of paddy were harvested. There was again a high proportion of cracked grain which reduced the quality of the crop. The reasons for this are still not fully understood, but it may be connected with sun cracking. Electric fencing proved a satisfactory deterrent to elephant until high floods rendered the fence inoperative.

X.—AGRICULTURAL EDUCATION

Reference was made in last year's report to an investigation which had been made into the working of the agricultural syllabus at primary and middle schools. A good start was made during 1956 in giving effect to the recommendations which were made for changes in emphasis in the agricultural work at the schools. New basic syllabuses, on which the agricultural teaching in different ecological zones is designed, were drawn up and were adopted at most schools with the commencement of the new school year in November. In most Provinces the detailed local syllabuses for classroom and field work have been prepared, including in the Tanga Province, a very comprehensive "text book" and directions for the primary school teacher. Changes in school holidays have been arranged in most Provinces to ensure that schoolchildren are at school during the most important parts of the crop season, and this will have an important bearing on the effectiveness of practical instruction.

Agricultural staff have paid particular attention to the careful planning and re-organization of production farms at selected middle schools. Good progress was made in all Provinces but it was necessary to limit the scope of this work in view of the large number of schools concerned, and in view of the fact that several still do not have a trained agricultural teacher, without whom (with a few notable exceptions) practical field work too often does not receive sufficient interest and guidance. This work is badly handicapped in many districts through middle schools being sited either on the worst land in the neighbourhood, or by not having sufficient land to permit the organization of a production farm.

Two series of talks on agricultural work at middle schools, one of six and the other of eight periods, were prepared for inclusion in the schools broadcasts put out by the Tanganyika Broadcasting Corporation.

The training of teachers for middle schools was again given priority at the Agricultural Training Centre, Ukiriguru. Thirty-seven teachers completed the first course in August and a further forty-three entered the Centre in November. Courses for teachers also continued at the Natural Resources School and at the Training Centre at Mahiwa in the Southern Province. When the output of these courses is available most middle schools will have a trained agricultural teacher on the staff.

There has been sustained interest in the Young Farmers' Club movement in the Lake Province and a start has now been made in the Eastern Province. There are now 23 Clubs, of which 19 are in the Lake Province. The movement in East Lake reached a further stage of development with the formation of a Federation of Young Farmers' Clubs; an Advisory Committee was also set up. Club activities included two successful rallies at agricultural shows, where numerous competitions were held, and visits to agricultural stations and places of interesting agricultural development. Clubs are encouraged to help themselves in raising funds to reduce grants and several made money or received gifts of livestock in return for work done for neighbouring farmers. Some Club members, about to leave school, are interested in forming Young Farmers' Clubs in their home villages. In order to guide this development, and the existing Clubs, an Assistant Agricultural Officer was posted to Musoma to work specifically among them. Young Farmers' Clubs require a very great deal of careful guidance and nursing in their early stages and much time is required

for the careful training of leaders and committee men. In order to safeguard the movement from the effects of over enthusiastic development, only a limited number of clubs is to be encouraged in a new area in the beginning. The circulation of the East Lake newspaper *Ukulima wa Kisasa*, started in conjunction with the Young Farmers' Club movement, has increased considerably during the year, and has subscribers from all over the Territory.

The annual school shamba competitions, a feature in the Lake Province, are of great importance in maintaining interest in agriculture in schools. These competitions have given rise to keen rivalry and to a marked improvement in the standard of farming.

The greatest range for agricultural education, however, remains in the field among the peasant cultivators. Without a considerable improvement in the techniques used by them, the much needed increase in agricultural productivity cannot be achieved. It is impossible for the senior staff to contact more than a small fraction of this great body of people, and the need for more highly trained field instructors is of paramount importance. More particularly is it important that these men should be fully conversant with propaganda methods. The training of field instructors continued at the Agricultural Training Centre, Ukiriguru, the Natural Resources School, Tengeru and at Mahiwa in the Southern Province, and the first batch of trainees from the Natural Resources School started work in the Department in 1956. These are young men, only three years out of school, and it is perhaps rather early to pass judgment on their potential value in the field. It is apparent, however, that while they may have acquired good technical grounding, they have yet to learn that this alone is not sufficient, and that a willingness to demonstrate physically what they wish to teach is essential. Thirty-six Field Assistants completed a two-year course at Ukiriguru Training Centre and thirty-one started the second year of their course. There was an intake of 48 Agricultural Instructors for a new two-year course in November.

The building of the new Wami Farm School in Morogoro District made good progress and arrangements for the opening of the first course on 14th January, 1957, have been made. The number of suitable applicants for the first course was somewhat disappointing and the School will open with ten students instead of the twelve for whom accommodation is available this year. The course will be strongly practical and the farmland at the school has been divided into a Home Farm and a School Farm. The former will expand to 500 acres and will be used to demonstrate the development and management of a mechanized mixed farm, being run on a strictly commercial basis. The School Farm is a much smaller area where students will obtain practical instruction in the operation of mechanical equipment and where small areas of a variety of crops not included in the Home Farm will be grown.

The Lake Province Ginners' Association made a generous gift of £25,000 to be applied to the improvement of African education. It is likely to be used at the Agricultural Training Centre, Ukiriguru, for the wives and families of agricultural staff and others attending the school. Shortage of water has prevented a start being made with the necessary buildings.

At Maruku, Bukoba District, a coffee school has been established by the Bukoba Native Coffee Board and useful courses were attended by committee men of various Co-operative Societies.

XI.—AGRICULTURAL EXTENSION AND PROPAGANDA

Field extension staff working among largely illiterate peoples, who dwell in widely scattered settlements, are faced with considerable problems in their attempts to gain the confidence of the farmers, without which there is little hope of advice being accepted. In the past the extension staff has been distributed in the districts on a geographical and population basis, the senior staff attempting to cover regularly the whole area in their charge. It has become apparent that this diffuse approach was not leading to useful improvement in agricultural practices in many districts; the distances and areas to be covered made it impossible for the senior officer to become known to the cultivators, and to establish contact with them and gain their confidence.

A new approach to the problem has now been adopted, which for want of a better term is called the "focal point" approach. In most districts there are generally areas of higher potential productivity than others, or with serious problems which require more urgent attention. By concentration on restricted areas within such parts of a District it is hoped that more rapid improvement may take place, and the area itself would then become a centre from which improvement will extend progressively through nearby areas to those further afield. In practice, junior field staff are thinned out in other areas, and concentrated in focal point areas, while the senior staff give most of their attention to them. Pre-requisites for the success of this approach are a genuine desire among the people for betterment and a sound basis of fact for the measures advocated.

The successful rehabilitation scheme in the Usambara mountains, referred to in more detail on page 36 has in fact been an example of the focal point approach, and due to the obvious benefits which have resulted, there has been a demand for similar work in the nearby Pare mountains. On the other hand, the work of a focal point soil conservation scheme in the Central Province was nullified by rainfall of such unusual intensity that the soil conservation works were largely destroyed.

In addition to this approach to the mass of cultivators on a limited front, is that of concentrating on the few who show themselves to be progressive. These men will themselves serve as focal points from which it is hoped improved methods will spread to their neighbours. Examples of these men can be found in many districts. In Kwimba District a small beginning has been made with planning farms for those who request assistance. So far this only covers better land use and the planning of cropping and stocking have not yet been included; this will follow later. A number of Africans have received loans from the African Productivity Loan Fund to enable them to farm larger areas or improve practices on their holdings, but the number of successful farmers who have been established in this way remains disappointingly low. As much assistance as possible is given to such men, in the hopes that they will become useful examples to their neighbours in due course.

Broadcasts from the Tanganyika Broadcasting Corporation in Dar es Salaam can now reach most areas of the Territory, and a weekly quarter-hour has been allocated to the Department. This has been used so far for a series of "agricultural reminders" drawing attention to important seasonal agricultural operations. While the number of receiving sets in country districts may not be high, village shops and places of refreshment often have sets where the villagers congregate to listen, so that this propaganda may reach more cultivators than might be expected.

The results from extension work are rarely spectacular, but it is possible to report the increasing use of manure in the Central Province and considerable movement towards the earlier planting of groundnuts there; a slowly developing interest in insecticides in the cotton crop in the Eastern Province; more interest in the control of *Antestia* by spraying in Songea District, and an increasing interest in the protection of young sesame plants by insecticide in the Southern Province; increasing use of manure in some districts of the Lake Province, where even the Wakuria, whose prestige is largely measured by the size of the dung heaps outside the houses, have been persuaded to use some of it for establishing coffee; an encouraging increase in tie ridging in Mwanza District and of coffee mulching in Bukoba; the general appreciation in Unyamwezi, Western Province, of the value of manuring and the greater use of ox-carts to move manure to the field; an increasing demand by individuals in the Northern Province for advice and assistance; a general expansion in desirable soil conservation practices and better coffee husbandry there; the development of small specially planted paddocks by the Waarusha; the general acceptance of improved land use methods in the Usambara Mountains and the growth of cattle byres and hand-feeding of livestock there; the development of a farmers' club in Muheza which through discussions and putting into effect advice, has been effective in spreading the practice of trash bunding; greater attention to better coffee husbandry in parts of the Southern Highlands Province and the growth of a more soundly based African pyrethrum industry in Njombe.

Visual aids are used whenever the opportunity is available, but there is a serious lack of material of local application and efforts are to be made to begin the production of film strips for specific local use. In the Eastern Province the "Bush School" technique continues to be used with some success in Kilosa, having been applied to the campaign for dusting cotton with insecticide.

XII.—RESEARCH

Last year reference was made to the steps being taken to re-organize and extend research work in the Territory. An additional fillip was given to this work by Colonial Development and Welfare grants of £126,000 from the Tanganyika allocation, towards the total cost of capital works, and of £99,616 from Central Research allocation, towards total recurrent costs. These sums are to be spent over four years to 31st March, 1960.

The building of the new research centre in the Northern Province, to serve the Northern, Tanga and Central Provinces, was started. By agreement with the Tanganyika Agricultural Corporation, the research work at Nachingwea is gradually being taken over by the Department, some staff arrived, and arrangements were made for taking over the research farm and buildings for laboratories. The four regions which will be served by Research Centres have a great variety of soil and climate which can only be adequately covered by carefully placed sub-stations, some of which are already in existence as agricultural stations. The research station of the Tanganyika Agricultural Corporation at Urambo will become a major sub-station for the Western Region, and an officer was appointed to take over the tobacco work there. Another sub-station was opened in the Eastern Province in the Wami area, and plans for others are being made.



Photograph by Public Relations Officer

Seed cotton being brought to a buying post in the Lake Province. The cotton is being carried in cloth squares, a practice which is being encouraged in order to reduce the chances of adulteration of the cotton with pieces of twine and other foreign matter, and to prevent damage to the fibres by the practice of using pointed sticks to pack the cotton into gunny bags.



Photograph by Public Relations Officer

The maintenance of quality in all export crops is of the highest importance. In the hard coffee industry of Bukoba careful drying of the coffee on racks raised from the ground is an important factor in improving quality.



Photograph by D. R. Brewin

There is a very active Young Farmers Club movement at Middle Schools in the East Lake Division of the Lake Province. Club rallies are held at which many different inter-club competitions take place. Members of a Club are shown competing in a sisal hedge-planting competition at the Kisangwa rally.

There was no major change in the pattern of work done during the past season, but it was more adequately co-ordinated and lines of work, with more emphasis on the maintenance and improvement of soil fertility, were more clearly defined. A full account of the work which was done during the year appears in Part II of this report.

XIII.—LOCAL GOVERNMENT

No further county councils were formed during the year, but considerable thought was given to the shape which future councils might take and the agricultural functions which they might control. The unwieldiness of the South East Lake County Council became more obvious, and a decided tendency towards greater decentralization developed. It is now clearer than ever that to be viable, local government bodies must cover an area small enough to ensure that all the inhabitants can take a personal and enthusiastic interest in the matters which come up for action or discussion, and it is only under such conditions that they can play a full role in agricultural development.

XIV.—AGRICULTURAL SHOWS

The show season of 1956 will be largely memorable for the visit paid to the Moshi Trade and Agricultural Show by Her Royal Highness the Princess Margaret, during her tour of Tanganyika. The coffee industry staged a spectacular display showing all stages of coffee production and Her Royal Highness took a cup of coffee at the fine café stand erected by the industry.

In the Lake Province the annual Agricultural and Trade Show was held at Mwanza, while District shows were staged at Maruku, Maswa, Lubaga, Ukerewe and Kisangwa. The last show was notable for the holding of the second Young Farmers' Clubs Rally, which was a great success. A third rally was held at the Ukerewe show.

The first Eastern Province Agricultural and Trade Show was held at Morogoro at the end of August, and was opened by His Excellency the Officer Administering the Government.

District Agricultural shows were also held in Nzega and Kasulu, in the Western Province, and for the first time in Manyoni, in the Central Province. A show was also held for the first time at the Usambara Native Authority Headquarters at Lushoto. The number and quality of the exhibits were good.

In general there is considerable room for improvement in the standard and preparation of exhibits and in their display but there was some outstanding produce at the Nzega Show. It is thought that the smaller primarily agricultural District Show, with emphasis on educational demonstrations of local application is of more value, and reaches a larger number of peasant cultivators than the larger show, with a strong commercial bias. But there is little doubt that agricultural shows are of considerable value in rousing interest in agricultural matters, and in providing Natural Resources Departments with an excellent opportunity of explaining and demonstrating to a large number of people the aims of their policy in the field.

XV.—FISHERIES

For the third year in succession the Fisheries Section of the Department has not been up to full strength. The failure to recruit a suitably qualified Fisheries Officer from the United Kingdom early in the year led to the vacancy being

frozen on grounds of economy. One officer was fully engaged on Marine Fisheries work throughout the year and another on fish culture work in the Tanga and Northern Provinces. It fell to the lot of the Fisheries Officer at Headquarters to supervise inland fisheries work in the rest of the Territory, in addition to his administrative and advisory duties. Much useful work has been accomplished in the provinces by African fisheries staff working with little direct guidance other than the keen interest shown by Agricultural and Field Officers in fisheries development.

Fisheries policy remains as stated in last year's report, viz: the development of the existing coastal and inland fisheries by extension methods, with the emphasis on the focal point approach and the development of new fish resources with the emphasis on the stocking of dams and water impoundments primarily constructed for other purposes.

Marine Fisheries. The survey of the native fisheries of the entire coastline, referred to in last year's report, was completed in August, the Marine Fisheries Officer having been based on Tanga from January to April, and on Bagamoyo from April till August, to carry out this work in the Tanga and Eastern Provinces respectively. A considerable volume of very valuable information was obtained which now remains to be fully analysed and written up. During the course of this survey the Fisheries Officer was able to carry out some useful incidental work, including advice to fishermen on simple improvements of gear, advice to local authorities on fish marketing, the examination of loan applications for fishing projects and the organization of supplies of fishing gear.

A preliminary estimate of the volume of native fishing effort during the survey indicates that for the 525 miles of our coast (including the perimeter of Mafia Island), some 3,500 men are engaged in fishing, of whom about 20 per cent are full-time fishermen. In addition about 1,000 women are engaged in part-time fishing activities such as shell-fish gathering and "dagaa" fishing with cloth seines, which is exclusively a feminine occupation. The total value of craft employed in the industry is estimated at £57,000 and consists of over 200 larger vessels (mashuas Daus), nearly 800 outrigger canoes (ngalawas) and more than 500 smaller canoes. Seasonal fishermen from Kenya, Zanzibar, Pemba and Portuguese East Africa are operating in our waters at certain times and places.

A great diversity of fishing methods and the exploitation of a very wide range of marine resources have been revealed. With much fishing at subsistence level and the majority of surplus catches bartered or sold without passing through markets, it is virtually impossible to obtain a reliable estimate for overall production, but this is considered to be at least 5,000 tons (fresh weight) per annum, worth £250,000 at an overall arbitrary value of 50 cents a lb. In the larger towns fresh fish is sold for from Shs. 1 20 to Shs. 1 50 per lb. In October the fisheries officer reported that upwards of 1,000 lb. of fish per day at Shs. 1/20 per lb. was passing through the newly-established Ngamiani market at Tanga.

The coastal fisheries survey indicated that the Tanga Province coastline was the most promising for intensive development work by the focal point approach. Accordingly a Marine Fisheries base was established at Pangani in August, and the Marine Fisheries Officer has already launched an extensive programme of trials and demonstrations of new or improved fishing methods with the Pangani fishermen.

An increasing interest has been shown by coastal fishermen in obtaining loans from the African Productivity Loan Fund for the purchase of gear. Unfortunately, in some instances, little security is available other than the applicant's fishing boat, and the African Loan Funds Committee are investigating the possibilities of organizing insurance for such boats so that they can reasonably be accepted as security. A new type of revolving loan fund has been established at Pangani as an experiment. This is to enable loans for the purchase of small items of gear, such as nets, to be made to fishermen having little security. A limited number of such loans will be made, and, until these are repaid, no more will be issued. It is considered that the entire fishing community will therefore have an interest in the speedy turn round of this fund.

A 22-foot wooden Danish fishing boat, powered by a simple semi-diesel engine, is on order for Pangani, and but for the Suez crisis, would have been delivered by the end of the year. This is a type of vessel which has already proved itself in Kenya and Zanzibar waters. It is intended as a prototype model for trials and demonstrations of simple and inexpensive fishing methods with a view to the acquisition of such vessels by African fishermen with the aid of loan funds. The gear for use from this boat has already been assembled. Initially the emphasis will be on shark fishing. Stocks of shark have been proven, and there is a good and steady market for shark meat. Considerable quantities of dried shark are imported into the Territory each year from the Red Sea and the Persian Gulf, and there are very good opportunities for the expansion of a local industry.

There has been greatly increased activity amongst the sedentary fisheries of the coast this year. Under this heading are included the collection of seaweed, *bêche-de-mer* (Holothurians) and shells. £706 was collected by Government in royalties on the export of sea-weed and *bêche-de-mer*. A lease for the exclusive right to collect sea-weed from the coast for a period of five years was negotiated by Government during the year. There has been very great interest in the collection of, and prospecting for supplies of the Green Snail Shell (*Turbo* sp.). This "mother-of-pearl" type shell, which is used for button manufacture and ornamental inlay work, is now fetching £600 per ton for Grade A quality.

Inland Fisheries.—The "dagaa" fisheries of Lake Tanganyika have enjoyed another prosperous year and continue to expand. Exports passing through Kigoma are recorded as 1,990 tons (compared with 1,550 tons in 1955), of which 458 tons were exported to ports in Belgian territory against hard currency. Again these figures do not reflect full production, as exports by individual Africans direct to Belgian and Northern Rhodesian ports have been on the increase with the continuing sales of outboard engines to the fishermen. With the now universal use of the pressure lamps introduced by the Department, expansion of the fishery has been particularly marked in the remoter southern parts of the Lake, where formerly difficulty in obtaining adequate supplies of "mwenge" (the wood fuel illumination used for attracting the fish), was the limiting factor. Exports from Mpanda District at 208 tons are more than double those of last year.

Although there has been a reasonable amount of water in the lake this year, the fisheries of Lake Rukwa have remained stagnant. The wholesale enterprise operating in the area ceased to fish and also ceased to purchase, process and market the native catch. No difficulty was encountered in disposing of the native

catch but the fishermen were far from satisfied with the prices received from the itinerant fish buyers. The Lake Rukwa Fisheries Board dissociated itself from any direct activities in marketing, but has recommended an investigation into the possibilities of organizing co-operative marketing.

Although this Department does not directly operate on Lake Victoria, it should be recorded that the Lake Victoria Fisheries Service estimate of production from the Tanganyika waters of the lake was 21,000 tons of fish, valued at £1,200,000. Twelve thousand fisherman's licences were issued on our waters during the year.

As a result of reasonable rainfall the majority of the many minor inland fisheries in the Territory enjoyed a good year. In particular may be mentioned the fisheries of the Bahi Depression, the Malagarasi Swamps and the Kilombero River, all of whose products were widely distributed throughout the Territory. It is usually impossible to obtain reliable figures of production from such fisheries but it may be noted that from Bahi alone, 120 tons of smoked Catfish were railed during the year and at least another 20 per cent is distributed by lorry and headload. This represents at least 450 tons fresh weight of fish.

A new minor fishery of especial interest is that on the Mianje Mungaa dam in Singida District. The fishery is for *Tilapia* which were stocked in this very large dam by the Department. A number of immigrant fishermen, including Kenya Luo, are now established on the shores of the dam and are supplying Singida regularly with fresh fish. Some local Waramba, with no previous tradition of fishing, are now entering this small but useful fishery.

The interest in stocking dams has grown apace, in particular in the Central Province and in those areas of the Southern Province remote from natural fish supplies. Few records are kept of the yield of fish from dams, but it is evident that in many instances most useful contributions to protein supplies are being made from this source. A careful assessment of the catch from the Songwa Dam, Shinyanga District, showed that some 10,000 fish per month were being landed by many Africans fishing with simple hook and line. Outstanding yields are being obtained from the 200-acre Kerenge Dam in Tanga Province, whose fishery is carefully supervised by the European manager of the estate on which it is situated. An average of 2,000 lb. of fish per month was being obtained from this dam by seine net. With the introduction of a nylon gill net at the end of the year the catch was more than doubled; 9,650 lb. of fish, all *Tilapia* of 1 lb. or more, having been landed in 61 days.

Fish Culture.—Experimental work on fish farming as such has now ceased at Korogwe and the departmental ponds there have been handed over to the East African Institute for Malaria and Vector Borne Diseases for their experimental work on the control of mosquito larvae and the snail vectors of schistosomiasis. Supplies of fry from these ponds will continue to be available for stocking in the Tanga Province.

The rearing of fish as a pond crop having proved generally disappointing, the Department no longer advocates the construction of special fish ponds, and few such new ponds were built this year. Although the area is in general unsuitable for *Tilapia* culture, there is some enthusiasm in Songea District for fish ponds and a large number of Africans have built small ponds on their shambas, largely for the fattening up of fry obtained from the Native Authority ponds.

The officer engaged in fish culture work is now stationed at Malva to carry out a programme of investigation into the ecology, stocking and fishing of dams, and to initiate a programme of extension work on improved methods of dam fishing in the Lake and Western Provinces.

The Department maintained, or had an interest in, ponds for the supply of fry for dam stocking in the Tanga, Northern, Lake, Western and Southern Provinces. Elsewhere, as has been proved in the Central Province, supplies of fry for stocking are readily obtainable from dams already stocked.

XVI.—FINANCE

The department became self-accounting on July 1st, but unfortunately the machine around which the whole system revolves was not ready on time, and this caused a great deal of delay and extra work. By the end of the year, however, the system was working smoothly, and the headquarters staff deserve special mention for the long hours of hard work which they spent on this task. The reaction in the provinces to this change was very favourable once the details of the new procedure had been mastered.

The gross total sum budgeted for the department for the financial year 1st July, 1956 to 30th June, 1957, is £763,803; an increase of approximately £100,000 on the previous year is largely due to expenditure on expanding research services.

XVII.—LEGISLATION

(A) ORDINANCES:

Cotton: The Cotton (Amendment) Ordinance 1956 effected certain amendments which experience gained in the operation of the Cotton Ordinance 1956 had shown to be desirable. Provision has been made for a period of validity to be placed on certificates of registration of cotton buyers and on Ginnery Licences; the law regarding the movement of raw cotton has been clarified and the Director of Agriculture has been empowered to suspend the operation of a ginnery where faulty ginning has occurred, until the faults have been rectified.

The Lint and Seed Marketing (Amendment) Ordinance 1956 validated loans formerly made to registered Co-operative Societies and laid down conditions under which the Lint and Seed Marketing Board may make loans.

Tea: The Tea (Amendment) Ordinance 1956 made provision for planters to make returns for registration purposes on request of the Tea Board, and removed the necessity of a licence to plant tea.

(B) RULES, REGULATIONS AND ORDERS:

Coffee: The African Agricultural Products (Control and Marketing) (Coffee) (Meru Chiefdom) Order 1956 established the Meru Chiefdom Native Coffee Board.

The Produce Export (Bukoba and Kimwani) (Coffee) (Amendment) Rules 1956 made changes in the description of undergrade coffee.

Seeds: The Export Seeds (Levy) Order was revoked.

Plant Protection: The Khapra Beetle (*Trogoderma granarium*) was declared a pest and the Plant Protection (Compulsory Fumigation of Imports) Order was promulgated in an endeavour to prevent the entry of this pest into the Territory.

The Plant Protection (Import) Order 1950 was amended to provide for the inspection and treatment of a variety of used articles which might carry pests or diseases, and to provide for the exception of plant importations from Kenya, Uganda and Zanzibar from the operation of the Order.

Sisal: The Produce Export (Sisal) Rules 1930 were revoked.

The provisions of the Crops (Unlawful Possession) Ordinance were applied to Nachingwea District.

Native Authority Ordinance: Efforts have been made in the past to standardize rules and orders throughout the Lake Province, made under Section 9 of this Ordinance. The result of a relaxation of a rule has usually been a swing away from the practice, followed by a gradual return to it. This has been noticeable in the yearly cultivation of an acre of cassava in Nassa; in tie-ridging in Ngara and in manuring in many areas.

Provision was made during the year for the making of rules under section 9 of this Ordinance, as follows:

1. In Unyamwezi to control soil erosion.
2. In North Mara to control the developing coffee industry.

XVIII.—STAFF

The Director, Mr. J. R. P. Soper, and the Deputy Director, Mr. A. P. S. Forbes, were in charge of the Department during the year, and there were no changes in appointments among the senior ranks.

The Department was sorry to lose Mr. R. W. Collett, Agricultural Officer, who retired after twenty-eight years service with the Department. Three Agricultural Officers with ten years service or more were transferred to other Territories on promotion. The Department could ill afford to spare them as there are very few officers with this length of service and experience now left in the Department. Mr. F. E. Luscombe went to Nyasaland as Chief Agricultural Officer; Mr. J. D. Hunter-Smith was promoted Chief Agricultural Officer, Swaziland, and Mr. J. S. Gunn went to the West African Institute for Oil Palm Research as Senior Agronomist.

Three Agricultural Officers joined the Department, one being a newly-appointed probationer. Five Field Officers left the Department, two were promoted to Senior Field Officer, and there were fourteen new appointments. There are still five vacant posts. Four newly-qualified Makerere Diplomates have been accepted as Assistant Agricultural Officers and are due to arrive early in 1957.

One new Entomologist, one Soils Chemist and one Botanist were appointed to the Research branch, but it has not yet been possible to fill the two vacant Plant Pathologist posts.

The dearth of capable and experienced clerks, which is not confined to this department, continued to place an unduly heavy burden on senior officers. A new framework for the department was drawn up by the Clerical Grading Committee, but it was quite impossible to fill all the recommended posts, and at the end of the year 11 out of 23 Upper Division posts were unfilled or only occupied by temporary personnel.

Four Senior Field Assistant and three Senior Recorder posts were created in the E2-1 bracket (£387 to £555 per annum), in order to provide an avenue of promotion for outstanding officers in these cadres. These attractive prospects should have a beneficial effect on future recruitment.

Staff as on 31st December, 1956:

The following figures do not include officers on leave pending resignation, retirement or completion of agreement.

- 1 Director
- 1 Deputy Director
- 1 Assistant Director (Research)
- 4 Assistant Directors
- 2 Senior Research Officers
- 3 Entomologists
- 1 Plant Pathologist
- 1 Plant Physiologist
- 3 Botanists
- 40 Senior Agricultural Officers and Agricultural Officers
- 3 Fisheries Officers
- 1 Zoologist
- 1 Horticulturist
- 1 Education Officer (seconded from Education Department)
- 1 Chemist (seconded from Government Chemist's Department)
- 1 Treasury Accountant (seconded from Accountant-General's Department)
- 1 Secretary (seconded Agricultural Officer)
- 8 Senior Field Officers
- 2 Tobacco Officers
- 1 Ginnery Officer
- 89 Field Officers (Agriculture)
- 1 Coffee Grader
- 6 Assistant Agricultural Officers
- 1 Research Assistant
- 6 Agricultural Foremen
- 1 Office Superintendent
- 1 Assistant Field Officer (Agriculture)
- 7 Personal Secretaries
- 4 Office Assistants
- 2 Accounts Assistants
- 1 Mechanical Instructor
- 1 Master
- 19 Clerks (Upper Division) (7 Temporary)
- 98 Clerks (General Division and Subordinate Service)
- 1 Senior Field Assistant
- 320 Field Assistants
- 920 Agricultural Auxiliaries/Senior Agricultural Auxiliaries
- 1 Senior Farm Bailiff
- 8 Farm Bailiffs
- 2 Junior Farm Bailiffs
- 2 Chemical Assistants
- 1 Coffee Grading Assistant

7	Coffee Grading Auxiliaries
5	Artisans
2	Laboratory Assistants
7	Laboratory Auxiliaries
2	Motor and tractor drivers
2	Senior Recorders
15	Recorders
37	Junior Recorders
51	{ Recorder Assistants
	{ Senior Recorder Assistants
4	Fisheries Assistants
13	Fisheries Guards/Senior Fisheries Guards
178	Subordinate Service Staff (various)
20	Overseers
1	Telephone Operator

XIX.—CONCLUSION

In conclusion I take this opportunity of thanking the staff of the Department at all levels for their loyal support during the year and for their co-operation in adapting themselves to the increasing tempo of our work. I make particular mention of the officers who organized the international soil conservation meeting at Dodoma and also, once again, of the staff in the accounts section. I also express my thanks and appreciation to all the unofficial members who have given much of their time to service on the various boards and committees connected with the work of the Department.

J. R. P. SOPER,
Director of Agriculture

MONTHLY RAINFALL IN INCHES FOR SEASON 1955/56 AND YEAR 1956
AT PROVINCIAL STATIONS

	Morogoro		Dodoma		Tabora		Mwanza		Mbeya		Arusha		Lushoto		Mtwara	
	Ins.	Average Ins.	Ins.	Average Ins.	Ins.	Average Ins.	Ins.	Average Ins.	Ins.	Average Ins.	Ins.	Average Ins.	Ins.	Average Ins.	Ins.	Average Ins.
October, 1955	0.13	0.97	0.00	0.18	0.00	0.58	0.19	1.84	0.00	0.56	0.08	1.15	0.51	1.43	*	1.09
November, 1955	2.91	2.04	0.05	0.87	1.39	3.90	2.45	4.49	1.62	2.17	0.80	3.43	4.45	3.85	*	1.30
December, 1955	3.57	2.81	5.94	3.78	6.98	6.71	6.52	5.77	5.87	5.35	7.03	4.34	3.91	4.26	*	7.45
January, 1956	4.72	3.77	7.41	5.76	8.96	4.99	3.85	3.69	13.41	7.43	7.13	1.78	6.42	2.96	16.72	8.57
February, 1956	8.15	3.93	3.49	4.17	3.43	4.86	3.00	4.21	6.24	6.35	2.25	2.98	3.11	2.97	5.46	5.87
March, 1956	3.29	6.71	2.03	5.08	4.01	6.56	4.87	6.00	4.92	6.17	3.22	6.28	6.42	5.56	5.75	6.09
April, 1956	12.57	8.08	7.21	1.91	4.07	5.41	7.05	5.78	6.49	4.62	7.01	13.69	6.50	8.79	7.12	7.70
May, 1956	3.13	4.00	0.00	0.22	0.02	1.13	1.76	3.73	0.10	0.74	0.99	7.29	2.09	7.39	1.41	2.53
June, 1956	0.60	1.06	0.00	0.04	0.00	0.10	0.00	0.74	0.00	0.05	0.36	1.06	0.73	2.09	1.24	0.21
July, 1956	0.01	0.55	0.00	0.00	0.00	0.00	0.00	0.54	0.00	0.03	0.00	0.43	0.53	1.40	0.91	0.28
August, 1956	0.01	0.37	0.00	0.00	0.02	0.04	0.19	0.78	0.00	0.05	0.00	0.55	0.00	0.87	0.07	0.39
September, 1956	0.34	0.65	0.00	0.06	0.28	0.28	2.16	1.76	0.00	0.11	0.26	0.63	0.79	0.66	1.05	5.62
Total for Season	39.42	34.94	26.13	22.07	29.16	34.56	32.04	39.33	38.65	33.63	29.13	43.61	35.46	42.23	*	47.10
October, 1956	0.21	0.95	0.00	0.18	0.24	0.57	7.49	1.78	0.00	0.54	0.33	1.10	1.02	1.40	1.28	1.09
November, 1956	1.47	2.06	0.00	0.84	0.91	3.85	4.55	4.42	2.42	2.14	1.41	3.31	3.54	3.86	0.06	1.30
December, 1956	1.59	2.83	5.78	3.86	9.73	6.72	2.75	5.79	6.94	5.37	1.35	4.47	1.84	4.26	4.71	7.45
Total for 1956	36.09	34.96	25.92	22.12	31.67	34.51	37.67	39.22	40.52	33.60	24.31	43.53	32.99	42.21	45.78	47.10

*Figures not available.

CROP PRODUCTION FIGURES

(A) MAJOR CROPS

<i>Sisal</i>				Production in tons	Export in tons	Value of Export in £
Year						
1952	...	...	...	162,185	156,167	21,708,053
1953	...	...	...	168,763	171,151	12,773,839
1954	...	...	...	178,250	167,642	10,902,109
1955	...	...	...	176,499	173,676	9,956,151
1956	...	...	...	185,762	186,867	10,899,678

COFFEE

(a) *Mild Coffees*

<i>Province</i>	<i>Area</i>			Tons of clean coffee*		1955/56
				1953/54	1954/55	
<i>Northern</i>	K.N.C.U.	...	...	6,600	4,450	6,660
	Warusha	...	...		125	182
	Wameru	...	...		184	369
	Estates (Non-native)	...	...	1,520	2,200	2,880
<i>Southern Highlands</i>	Rungwe	...	...	452	780	-
	Mbeya/Mbozi (Native)	...	...	180	122	116
	Mbeya/Mbozi (Estates)	...	...	170	147	164
	Lupembe	...	...	4	12	29
<i>Southern</i>	Songea	...	...	236	390	490
<i>Tanga</i>	Pare	...	...	83	103	103
	Lushoto	...	...	93	150	140
	Estates	...	...	35	83	61
				9,373	8,746	11,194

*In the past these figures have been shown as tons of parchment. It is considered that it is more appropriate to quote production as clean coffee.

COFFEE

(b) *Hard Coffees*

<i>Province:</i>	Tons of clean coffee		
	1953/54	1954/55	1955/56
Lake	7,230	8,627	9,144
Tanga	33	30	29
Eastern	55	51	331
	7,318	8,708	9,504

COTTON

<i>Province</i>	Production in Bales of 400 lb.				
	1952	1953	1954	1955	1956 (estimate)
Lake	70,298	38,600	90,859	108,843	121,000
Eastern	6,723	9,927	8,966	8,439	8,460
Northern	562	1,864	2,191	2,834	1,260
Tanga			364	1,814	1,700
Southern	179	247	258	128	35
	77,763	50,638	102,638	122,058	132,455

CASHEW NUTS

Tons of nuts sold through local markets

Province	1952	1953	1954	1955	1956
Southern ...	9,064	8,768	11,500	13,233	14,363
Eastern ...	1,745	1,297	1,658	1,799	2,284
	10,809	10,065	13,158	15,032	16,647

CASSAVA

Tons sold through local markets

Province	1952	1953	1954	1955	1956
Southern ...	26,000	8,044	4,297	8,786	21,387
Eastern ...	127	236	487	245	337
Central ...	—	606	20	18	—
Western ...	3,150	3,423	4,243	5,935	9,648
Lake ...	—	—	37	10	100
	29,277	12,309	9,084	14,994	31,472

COCONUTS

Tons of Copra

Province	1952	1953	1954	1955	1956
Southern ...	824	419	495	552	852
Tanga ...	4,081	5,821	4,794	5,486	4,607
Eastern ...	9,988	5,856	7,299	4,955	4,204
	14,893	12,096	12,588	10,993	9,663

MAIZE

Province	1954	1955	1956
		(a)	
Southern Highlands ...	13,399	25,766	7,250
Northern ...	17,173	36,041	26,000
Southern ...	4,550	2,670	3,990
Western ...	10,032	17,864	7,615
Eastern ...	6,271	20,069	6,560
Central ...	562	3,322	2,650
Tanga ...	1,050	9,118	2,248
Lake ...	4,429	5,740	3,687
	57,466	120,590	60,000

(a) These figures are different from those shown in the Annual Report for 1955 due to readjustments in Provincial figures.

NOTE:—The figures for 1954 and 1955 are the actual tonnages delivered to Grain Storage Department when control was in force. The figures for 1956 are the tonnage sold through normal channels. The figure for the Southern Province includes sales by Tanganyika Agricultural Corporation.

OIL SEEDS

(a) Groundnuts

Tons sold through local markets

Province	1952	1953	1954	1955	1956
Lake ...	2,199	20	843	827	2,081
Central ...	2,590	388	654	550	2,096
Western ...	5,461	389	1,131	3,122	6,035
Southern ...	632	406	1,480	3,985	4,158
					(a)
Southern Highlands ...	—	—	—	79	79
Northern ...	—	—	—	—	211
	10,882	1,183	4,108	8,563	14,660

(a) Includes sales by Tanganyika Agricultural Corporation

(b) *Sesame*

Tons sold through local markets

Province	1952	1953	1954	1955	1956
Southern... ..	1,549	1,286	2,490	4,138	6,176
Eastern	286	229	184	299	558
Lake	64	3	33	36	65
Central	—	—	—	43	50
Western	—	—	—	—	45
	<u>1,899</u>	<u>1,518</u>	<u>2,707</u>	<u>4,516</u>	<u>6,894</u>

(c) *Sunflower*

Tons of seed sold through local markets

Province	1952	1953	1954	1955	1956
Southern Highlands	960	160	355	289	701
Central	265	80	155	104	356
Western	6,028	446	1,512	5,311	3,482
Eastern	1,303	568	658	603	1,326
					(a)
Northern	738	420	594	968	451
Southern... ..	1,042	176	508	539	738
Lake	1,777	316	677	2,423	886
Tanga	179	216	93	109	17
	<u>12,292</u>	<u>2,382</u>	<u>4,552</u>	<u>10,346</u>	<u>7,957</u>

(a) Includes 400 tons estate production

PULSES

(including yellow peas, chickpea, soya, mixed beans, cowpea, gram, pigeon pea, bambarra nuts).

Province	1952	1953	1954	1955	1956
Southern... ..	4,652	1,076	2,237	2,700	2,794
					(a)
Central	160	15	31	73	106
Western	1,991	867	1,754	2,680	1,892
Lake	6,977	4,137	6,890	4,472	2,299
Southern Highlands	2,630	1,189	1,210	1,064	2,208
Eastern	613	752	688	565	592
Northern	3,728	4,297	4,022	*1,398	4,147
Tanga	—	—	—	618	276
	<u>20,751</u>	<u>12,333</u>	<u>16,732</u>	<u>13,570</u>	<u>14,314</u>

(*excluding haricot beans, 1,358 tons)

(a) Includes sales by Tanganyika Agricultural Corporation

PYRETHRUM

Tons of dried flowers

Province	1952	1953	1954	1955	1956
Northern	107	125	360	379	479
Southern Highlands	133	150	175	234	261
	<u>240</u>	<u>275</u>	<u>535</u>	<u>613</u>	<u>740</u>

RICE

Province	Tons of Paddy		1953	1954	1955	1956
	1952	1951/52				
Eastern	2,823	...	6,657	9,841	14,172	2,319
Central	—	...	—	—	48	—
Southern Highlands ...	3,000	...	5,769	6,890	6,042	2,709
Southern	1,392	...	662	1,215	2,276	1,835
Western	2,250	...	630	1,640	2,962	2,230
Lake	5,185	...	1,300	4,620	3,712	2,781
Northern	51	...	61	74	84	51
Tanga	938	...	1,750	2,321	2,783	2,436
	15,639	...	16,629	16,601	32,059	14,361

SEED BEANS

Tons exported ...	1951/52	1952/53	1953/54	1954/55	1955/56
	1,251	1,460	1,894	2,110	2,549

TEA

Manufactured tea in lb.

Province	1952	1953	1954	1955	1956
Southern Highlands ...	2,462,601	2,821,245	3,583,655	3,303,666	3,806,117
* Tanga ...				1,217,449	1,633,093
			Total...	4,521,115	5,439,210

TOBACCO

(a) Flue-cured

Cured leaf in lb.

Province	1952	1953	1954	1955	1956
Southern Highlands	2,290,087	1,995,325	3,269,407	2,909,890	2,738,283
Western	77,045	188,480	228,863	291,165	572,925
Southern	—	22,400	73,920	185,920	112,000
	2,367,132	2,206,205	3,572,190	3,386,975	3,423,208

(b) Fire-cured

Cured leaf in lb.

Area	1952	1953	1954	1955	1956
Songea	896,000	542,080	1,516,489	982,240	647,535
Nyamirembe	420,120	309,120	400,960	361,312	545,720
	1,316,120	851,200	1,917,440	1,343,582	1,193,255

WATTLE

1955

1956

Province	District	Acreage	Production (tons)	Acreage	Production (tons)
Southern Highlands	Iringa:				
	Dabaga	1,500	...	1,500	...
	Sao Hill	2,000	...	2,000	...
	Njombe:		180		370
	(native)	2,021		4,100	
	(C.D.C.)	33,000		35,000	
Northern	Moshi	—	295	N.A.	300
Tanga	Western Usambaras	2,538	4,154	N.A.	2,250
			4,629		2,920

WHEAT

Tons sold through organized markets

Province	1952	1953	1954	1955	1956
Northern ...	4,465	4,301	9,320	3,722	4,237
Southern Highlands ...	246	66	100	80	97
Southern ...	553	600	350	303	368
Western ...	—	7	—	28	68
Eastern ...	—	—	—	51	—
	<u>5,264</u>	<u>4,924</u>	<u>9,770</u>	<u>4,183</u>	<u>4,770</u>

(B) MINOR CROPS

Onions, in tons

Province	1952	1953	1954	1955	1956
Northern ...	1,763	1,460	1,603	2,297	3,911
Eastern ...	134	157	70	61	150
Central ...	261	200	317	160	272
Lake ...	2	—	250	8	25
Western ...	—	—	—	17	21
Southern ...	—	—	—	16	22
Southern Highlands	—	—	—	195	201
Tanga ...	—	—	—	—	53
	<u>2,160</u>	<u>1,817</u>	<u>2,240</u>	<u>2,754</u>	<u>4,655</u>

GUMS

(Arabic and Copal) in tons

Province	1952	1953	1954	1955	1956
Central ...	58	97	193	157	175
Western ...	206	375	397	426	285
Lake ...	148	232	256	402	158
	<u>412</u>	<u>602</u>	<u>846</u>	<u>985</u>	<u>618</u>

KAPOK

(in tons)

Province	1952	1953	1954	1955	1956
Tanga ...	167	320	110	337	415
Eastern ...	276	420	424	216	941
Southern ...	—	—	45	62	44
	<u>443</u>	<u>740</u>	<u>579</u>	<u>615</u>	<u>1,400</u>

OIL PALM

(a) Palm oil in tons

Province	1952	1953	1954	1955	1956
Western ...	35	64	110	83	47
Tanga ...	—	—	35	40	40
	<u>35</u>	<u>64</u>	<u>145</u>	<u>123</u>	<u>87</u>

(b) Kernels in tons

Province	1952	1953	1954	1955	1956
Western ...	334	499	488	370	351
Tanga ...	—	—	24	30	30
	<u>334</u>	<u>499</u>	<u>512</u>	<u>400</u>	<u>381</u>

EXPORTS FROM TANGANYIKA OF AGRICULTURAL PRODUCTS, 1952-1956

	Maximum Export prior to 1956		1952 Amount	1953 Amount	1954 Amount	1955 Amount	1956 Amount	Export value, 1956 £	
	Year	Tons							
Sisal	...	1955	173,676	171,151	167,642	173,676	185,588	10,823,430	
Cotton lint	...	1955	20,374	11,105	12,111	20,374	27,890	7,486,242	
Coffee	...	1954	19,382	18,619	19,382	18,499	21,625	9,236,833	
Barley	...	1955	452	88	293	452	—	—	
Beans and Pulses	...	1952	23,184	10,551	10,432	8,279	9,413	562,458	
Beans, Soya	...	1953	674	674	522	567	913	39,160	
Cashew nuts	...	1955	18,202	11,506	16,298	18,202	16,741	880,991	
Castor seed	...	1952	12,345	11,754	9,609	7,870	12,012	721,343	
Cassava	...	1952	15,177	561	1,714	2,486	3,051	59,513	
Copra	...	1928	9,318	5,505	1,083	4,723	3,788	204,459	
Fats	...	1948	1,689	79	91	83	64	4,027	
Gum Arabic	...	1950	2,319	564	1,346	2,125	1,542	151,751	
Gum Copal	...	1950	110	11	38	58	45	3,128	
Groundnuts	...	1936	22,786	9,435	2,503	5,586	15,143	1,017,106	
Kapok	...	1955	872	468	838	872	717	132,800	
Maize	...	1955	35,835	234	—	35,835	106,363	2,062,688	
Millet and Sorghum	...	1955	13,150	2,767	1,958	13,150	5,084	104,564	
Onions	...	1948	2,418	187	187	151	90	3,432	
Palm kernels	...	1954	674	374	578	674	386	20,364	
Papain	...	1948	130	43	83	37	17	38,684	
Peppercorn	...	1945	697	156	136	275	307	88,702	
Rice	...	1938	17,965	343	155	1,247	1,704	78,132	
Rubber	...	1944	1,314	2	—	—	—	—	
Sesame	...	1938	5,241	343	3,108	4,207	10,628	667,753	
Sugar	...	1941	5,454	496	1	—	33	1,079	
Sunflower seed	...	1952	17,708	10	2	—	14,729	482,752	
Tea	...	1955	1,689	1,011	1,566	1,689	1,979	542,843	
Tobacco	...	1948	1,421	641	350	448	135	25,779	
Vegetable Oils	...	1940	2,268	685	723	61	1,468	166,922	
Wattle bark	...	1955	4,837	979	2,122	4,837	3,178	74,154	
Wheat	...	1945	4,511	3	10	—	—	—	
Essential Oils	...	1950	9	3	2	3	4	7,770	
Total	...	—	—	298,011	254,751	264,775	338,696	444,723	£35,688,859

